JPRS 75145

15 February 1980

USSR Report

RESOURCES

No. 919

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50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. JPRS 75145	2.	3. Recipient's Accession No.

4. Title and Subtitle
USSR REPORT: RESOURCES, No. 919

5. Report Date
15 February 1980

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Joint Publications Research Service
1000 North Glebe Road
Arlington, Virginia 22201

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
As above

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This serial report contains information on energy, fuels and related equipment; fishing industry and marine resources; water resources, timber, and electric power and power equipment.

17. Document Analysis a. Descriptors

USSR
Natural Resources
Electric Power
Energy
Energy Conservation
Fisheries
Fuels
Timber
Forestry
Water Supply
Economics

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group 2C, 2F, 5C, 10, 21D

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited Availability Sold by NTIS Springfield, Virginia 22161	UNCLASSIFIED	60
	20. Security Class (This Page) UNCLASSIFIED	22. Price

(See ANSI-Z39.18)

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

JPRS 75145

15 February 1980

USSR REPORT

RESOURCES

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ELECTRIC POWER AND POWER EQUIPMENT

PUMP DEVELOPMENT, PRODUCTION DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 79 p 16

[Article by Candidate of Technical Sciences I. Shchipulin, director of the All-Union Scientific Research, Design and Technological Institute of Hydraulic Machinery: "Coordinate the Entire Chain"]

[Text] In his speech at the November Plenum of the CPSU Central Committee, Comrade L. I. Brezhnev mentioned that machine-building plants are taking too long to reorganize for the production of modern new products.

This is interfering especially with the fulfillment of coordinated programs. This fact is evident from our institute's performance in the introduction of new developments in the industry. Our institute, VNIIGidromash [All-Union Scientific Research, Design and Technological Institute of Hydraulic Machinery], designs pump equipment. This is one of the machine-building industry's most extensively produced products. There is no branch of the national economy in which it is not employed. Every sixth electric motor produced in the nation becomes a part of a pumping unit.

Soviet industry produces practically all of the types of pumps in use in the world--more than 1,000 type sizes and around 4,000 modifications.

They measure up to the modern technological level. Around 500 type sizes of the units have already been awarded the State Emblem of Quality.

The development of pump building in the nation has reached a level at which 95 percent of the list of such equipment needed can be filled with series-produced, standardized pumps, and only the remaining 5 percent of the units are newly developed items. As a rule, these are units with great individual capacity and with special demands made of their service life and reliability or units to be employed in totally new technological processes. They are produced to fill single, individual orders. These development projects ordinarily pertain to special assignments for the USSR State Committee on Science and Technology.

A total of 122 assignments were completed under the ninth Five-Year Plan as part of coordinated plans for the development of new pumping equipment, and the 10th Five-Year Plan includes 154 such assignments under 30 State Committee for Science and Technology programs.

In the 10th Five-Year Plan the work of this subbranch has been planned on a qualitatively new basis: five assignments for the development of new pumping equipment have been included at the initiative of VNIIGidromash in programs for the accomplishment of extremely important scientific and technological projects. The special nature of these assignments lies in the fact that they focus not upon the development of individual type sizes of machines essential to the accomplishment of important but specific orders from consumers, but upon basic renewal of the list of equipment produced and the designing of a new generation of units.

The development of a standardized series of console centrifugal pumps for general use in industry for water, chemically active liquids and drainage will make it possible to renew more than one-third of the units produced in the nation. The designs are based on a set of scientific research projects performed with the very latest in research facilities: laser and electronic measuring equipment for hydrodynamic experiments and electronic computers for the performance of hydrodynamic and power calculations and for the processing of experimental data. As a result, the quantity of metal used in the pumps and their dimensions have been reduced by 10-15 percent and the assemblies and parts have been standardized up to 90 percent. The efficiency factor has been increased an average of 2-3 percent. The new pumps are considerably more convenient to operate. Among other things, they can be repaired without disconnecting a unit from the pipelines.

The work carried out under the State Committee for Science and Technology's program has made it possible to involve 14 organizations and enterprises of six ministries and departments in the accomplishment of this assignment. Specialists with the Ministry of Electrical Equipment Industry have designed a modification of the single-series electric motors with an elongated shaft end for monoblock pumps. The employment of this shaft will make it possible to eliminate the bearing assembly in the pump, to reduce the weight of the units even more and to cut the amount of labor involved in their production. Organizations and enterprises under the USSR Ministry of Chemical Industry and Ministry of Nonferrous Metallurgy have created new materials and, most importantly, have applied advanced technology in the manufacture of parts out of these materials.

The State Plan for Economic and Social Development of the USSR for the Period 1976-1980 and the decree passed by the CPSU Central Committee and the USSR Council of Ministers "On the Further Development of Machine Building in 1978-1980" called for the production during this five-year period of an industry-experimental quantity of more than 2,500 of the standardized console pumps. A great deal has been accomplished. An agreement has already been concluded on creative cooperation between the VNIIGidromash team and the "Uralgidromash" association.

We are still concerned about certain lack of coordination, however. The organization of large-series production requires reequipping the Kataysk Pump Plant and the "Uralgidromash" association, as well as changing the list of cast items obtained under cooperative agreements. Unfortunately, we still have neither a technical reequipment plan nor the design for machine tools built of standardized parts.

The cast material for the pumps produced is provided under existing cooperative agreements, among others, by the Kurgan Wheeled Tractor Plant (G. I. Kondrat'yev, director) under the Ministry of Automotive Industry. The problem, however, lies in the fact that the cast materials for pumps are complex, labor-consuming and light of weight and great demands are made of their soundness and geometry and their surface quality. In short, their production is a "thankless" task for the producer. For a number of years it has categorically refused to make even minor improvements in the design of the cast parts.

It is well known, however, that the quality of cast pump parts affects the quality of the machine as a whole more so than in any other branch of machine building. Deformation of the shape or deviations from the requirements governing surface roughness inevitably results in a lowering of the efficiency factor and pressure and to deterioration of the units' cavitation indices. And, after all, deterioration of the efficiency factor by only 1 percent results in the waste of hundreds of millions of kilowatt-hours of electric energy in the operation of pumps in the national economy.

Under the 11th Five-Year Plan a foundry will be built in the "Uralgidromash" association. Its start-up should resolve urgent problems in the area of iron casting. The urgency of the situation with respect to cast items of carbon and stainless steel for chemical, power, petroleum and a number of other kinds of pumps is not being relieved, however. We believe that this problem can only be resolved by creating a special shop for casting and treating steel parts--also within the "Uralgidromash" association, for example. After all, we need to resolve this problem as a part of the overall situation. The peculiar nature of this production line lies in the great variety of designs of the parts produced and of the materials (grades of steel) used and in the small scale of their production.

There are other problems, as well. The VNIIreproduktor [All-Union Scientific Research Reduction Gear Institute?] under the Ministry of Machine Tool and Tool Building Industry has developed modern motor-reduction gears for metering pumps. The items have undergone successful interdepartmental testing, but the "Soyuzmashnormal'" association (P. P. Balkov, chief) has categorically refused to set up their series production, claiming a lack of production capacity. The VNIIPTIEM Institute (V. K. Petrov, director) under the Ministry of Electrical Equipment Industry has essentially removed itself from the job of creating the special electric motors with quiet-running pumps

used in the field of housing and utilities. The "Soyuzprompribor" association (A. S. Konstantinov, chief) under the Ministry of Instrument Making, Automation Equipment and Control Systems has, in turn, still not developed explosion-proof final control devices for metering pumps.

And this occurs because all of the stages involved in the adoption of new equipment have not been thoroughly outlined in the scientific and technological programs. Experience has shown that it may be a long time between the final stage of a program, that of producing an experimental-industrial batch of the articles, and the mastery of series production of the equipment.

The history of the mastery of console pumps is a typical example of the development of such gaps. An equally difficult situation has developed with respect to the metering equipment created under the State Committee for Science and Technology's program due to a delay in the modernizing of the Riga Chemical Machine-Building Plant.

Scientific and technological plans for the creation of new equipment must be closely linked with the entire group of problems involved in its mastery: the technical reoutfitting of enterprises, their expansion and planning and capital construction issues, and also with programs for state standardization and for scientific and technological cooperation with foreign nations.

We feel that comprehensive programs measure up most fully to the tasks contained in the decree passed by the CPSU Central Committee on further improving the economic system. They are, after all, essentially an integral part of long-range state plans for economic and social development and focus upon obtaining the greatest possible end results for the national economy.

11499
CSO: 1822

ELECTRIC POWER AND POWER EQUIPMENT

NEW ELECTRIC POWER TRANSMISSION LINE BUILT

Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 79 p 15

[Article: "High-Mountain LEP-500"]

[Text] A 500-kilovolt electric power transmission line has been built by subdivisions of the "Spetsset'stroy" trust from blueprints provided by the Central Asian branch of the "Energoset'proyekt" institute. It links the Toktugul GES in Kirgiziya by means of the Andizhan substation with the integrated power system of Central Asia. The LEP-500, which is around 173 kilometers long, was built at an elevation of more 3,000 meters above sea level.

High-Mountain LEP-500

An original solution to the problem of building the line across a 1.3-kilometer mountain gorge made it possible to employ two wires instead of three for this stage, to reduce the amount of labor required for installation by 30 percent and to conserve 15 tons of wire.

The actual cost of building the line was more than a million rubles less than the estimated cost due to the employment of innovations. Normal construction time was reduced by 7 months. The designing and construction of the high-mountain LEP-500 linking the Toktugul GES and the Andizhan substation received awards from the USSR Council of Ministers in 1979.

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DEVELOPMENT OF ELECTRIC POWER NETWORK DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Dec 79 p 2

[Response by Deputy USSR Minister of Power and Electrification F. Sapozhnikov to article published in SOTSIALISTICHESKAYA INDUSTRIYA]

[Text] Having reviewed the article "The Kilowatt Controversy" published in the 2 October 1979 issue of the newspaper SOTSIALISTICHESKAYA INDUSTRIYA, the USSR Ministry of Power and Electrification feels that the article properly presented issues pertaining to the further development of Kolyma and Chukotka power engineering.

The Ministry is giving a great deal of attention to the accomplishment of these tasks. The Kolymskaya GES, the Arkagalinskaya GRES, the Kolymskaya GES-Omsukchan 220-kilovolt electric power transmission line and other projects are presently under construction in Magadanskaya Oblast. Their start-up will make it possible to link the separate electric power plants in the oblast's south, permit them to operate jointly within a common electric power network and achieve a reliable electric power supply for the consumers.

The general plan has been completed for the development of power engineering in Magadanskaya Oblast for the 11th Five-Year Plan, which covers the period extending to the year 1990. In the period between 1981 and 1985, it is planned to further increase the generating capacity of the power system by placing the Kolymskaya GES into full-scale operation, by expanding the Magadanskaya TETs [Heat and Electric Power Plant] and the Egvekinotskaya GRES and by building a new TETs in Anadyr'. It is planned to build new electric power networks, which will make it possible to extend the boundaries of the centralized electric power supply system.

The article correctly notes the connection between an increase in the number of small electric power plants and the development of the system operation. The area's industrial consumers are mainly under the USSR Ministry of Nonferrous Metallurgy, and it should finance the construction of the electric power networks. It is our opinion that the start-up of second lines, including one for the "Dukat" mine, will make it possible sharply to reduce the number of small electric power plants and will make the electric power supply more reliable.

The newspaper correctly brings up the necessity of working out a long-range plan for the development of a power supply for enterprises of the extractive branch of industry. This job could be performed by the "Energoset'proyekt" institute of the USSR Ministry of Power and Electrification under an agreement with the "Severovostokzoloto" association.

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ELECTRIC POWER AND POWER EQUIPMENT

DISSATISFACTION WITH ELECTRICAL EQUIPMENT INDUSTRY AIRED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Dec 79 p 2

[Article by V. Shvedov, engineer with the "Tyazhpromelektroproyekt" All-Union Scientific Research and Planning Institute, Moscow: "On An 'Insecure Footing'"]

[Text] The expression "consumer representative" has recently come into use. An unusual situation has developed around this expression. It is mentioned in Gosstandart documents, but nowhere are the consumer representative's authority nor his duties legally defined. This is unquestionably a hindrance to his work.

Take, for example, our "Tyazhpromelektroproyekt" All-Union Scientific Research and Design Institute for the Total Electrification of Industrial Facilities, which is under the USSR Ministry of Installation and Special Construction Work. The electrical work at many projects has been performed according to plans provided by the institute. These include huge metallurgical enterprises in Magnitogorsk, Cherepovets, Lipetsk, Bhilai and Bokaro. The institute is engaged mainly in designing and research work, but since it is our head institute the Ministry of Installation and Special Construction has charged it with the function of representing the interests of consumers of electrical equipment of general industrial use. This means that we coordinate assignments for the development of items, the technical specifications and other documents with the electrical industry providing the equipment. As consumer representative, the institute also participates in the acceptance of electrical products and their certification for the Emblem of Quality. This work is financed by USSR Gosplan through the Institute of Electrical Industry.

What has resulted from our work? Unpleasant as it is for me, a worker with the institute, to say so, the results have not been encouraging. Take, for example, the semiconducting converting devices installed at many enterprises. The users are of the unanimous opinion that foreign devices are more reliable and operate more conveniently, that it is simpler to repair them, that they are lighter and smaller and possess a large number of other

superior qualities. The Soviet counterparts bear the Emblem of Quality, however. This is not a designer's device but an indication that the item measures up to the best such products existing anywhere in the world. Why have they been awarded the honored pentagon emblem?

This question is primarily addressed to my colleagues and me. After all, our institute endorsed the documents serving as the basis for the certification. The situation is clear. When an item developed with our institute's participation is awarded the Emblem of Quality, the manufacturing enterprise gives us part of the award received for it. We received bonuses, for example, from the Kursk Electrical Equipment Plant for fuses, from the Kontaktor Low-Voltage Equipment Plant in Ul'yanovsk for contactors and from the Moscow Electromechanical Plant for electric engines.

An absurd situation has developed. The attempt to resolve an important problem, that of motivating the designers to turn out quality products, is producing the opposite effect for industry. In reality, the institute, which is expected to promote the consumer's interests, is frequently led around by the electrical equipment industry. And a simple rein is used: If the institute signs the documents it receives money, otherwise it does not. Furthermore, the institute, which has an interest in the employment of new equipment in projects, does not make adequate demands of the level and quality of the items. This inevitably shows up in their operation.

In other words, we give greater consideration to the interests of the electrical equipment industry than to those of the consumers.

In general, do the consumers need a representative? This is a natural question. The answer is yes. They do, very much so! But not the kind of representative our institute presently provides, to be sure. Unlike the designers and the manufacturers, our consumers are not organized. They are not at liberty to select the best items but are forced to be satisfied with what they receive. As a result, they have for years, and sometimes decades, been provided with inferior products. Organizations like ours must speak out on this matter. They must summarize the operational experience of various enterprises and urge the designers to develop the required equipment to match the best in the world. They can accomplish this during the process of coordinating the technical specifications and assignments for an item or during the certification and acceptance process.

It is obvious that we must perfect the system of representation, in the absence of an extradepartmental organization, within the framework of existing institutions like ours. Conditions must be defined for it, however, which not only provide it with the opportunity but actually require it to represent the interests of the consumers. For this purpose, we must first of all define in an interdepartmental document applying to Gosstandart, the Ministry of Electrical Equipment Industry and the Ministry of Installation and Special Construction Work the list of items for which we represent the consumers' interests, as well as our authority and our obligations.

In addition, it is essential that the financing, as well as the awarding of bonuses for work based on representation, be effected not through the departments but through a state agency which can monitor the use of the equipment produced for efficiency. In this case, the function of such an agency might be performed by the USSR State Committee for Science and Technology, which is in charge of financing and of monitoring the institute's research work. It would be able to make demands with respect to the study of the interests of general industry ministries and departments, the acquisition and application of information on similar foreign products, summarization of the requirements of various enterprises, systematic and persistent support of the consumers' interests, and so forth. This would be control "from above." For control "from below" we must create at the institute a council of electrical equipment consumers, which must include representatives of the equipment operators, adjusters, installers and the foreign trade organizations involved. This council should review and produce decisions on basic issues--areas for the development of new items, specification of the most important and other characteristics of articles and coordination of a common position among the consumers. The council's decisions should be mandatory for the consumers' representative.

So the matter is now up to the State Committee for Science and Technology.

The consumer's means of influencing the developers and manufacturers must be fully applied. This will promote improvement of the quality of articles produced by Soviet industry.

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BRIEFS

TURBOGENERATOR CONSTRUCTION--Nizhnekamsk, Tatar ASSR--The first TETs-2 turbogenerator began operating yesterday. Its output is 135,000 kilowatts. The plant began providing electric power for new petrochemical facilities of the "Nizhnekamskneftekhim" association and heat for new housing developments in Nizhnekamsk. Construction and installation work is now under way on the next two turbogenerators, which will begin operating next year. [Text] [Moscow TRUD in Russian 30 Dec 79 p 1] 11499

ELECTRIC POWER UNIT--Gusinoozersk, Buryat ASSR--The fourth unit of the Gusinoozerskaya GRES has been placed into operation. Construction has been completed on the first stage of the thermal plant and its capacity has reached 840,000 kilowatts. Electric power will now be delivered to the Mongolian People's Republic, to the "Erdenet" combine, and will flow into Siberia's unified power system. [Text] [Moscow TRUD in Russian 1 Jan 80 p 1] 11499

NEW SUBSTATION--Kuybyshev--The current has been switched on at the "Golovnaya," a substation of the largest irrigation installation on the Middle Volga, the Kuybyshev Irrigation Canal. Credit goes to the collectives of Mechanized Column No 29 of the Volgoelektroset'stroy Trust, Installation Administration No 9 of the Elektrotsentromontazh Trust and their subcontractors. The electric power arriving at the substation will go to pumping stations on the canal and irrigation systems, to pipeline pumping stations and to villages in the southern rayons of Kuybyshevskaya Oblast. The substation will also link the power systems of the Middle Volga and Kazakhstan. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 26 Dec 79 p 2] 11499

HYDROELECTRIC POWER PLANT--Baypaza--Construction has begun in Tadzhikistan on yet another hydroelectric power plant, the sixth in the Vakhsh series--the Baypazinskaya GES which will have an output of 600,000 kilowatts. The GES was designed at the Central Asian Division of the Gidroproyekt Institute. The plant will be built by a newly-created section of the Nurekgesstroy Administration. The electric power plant will produce its first industrial current in 1984. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 26 Dec 79 p 1] 11499

NEW POWER UNIT--Mary--The fifth power unit at the Maryyskaya GRES has begun producing electricity. The capacity of the plant under construction on the bank of the Karakum Canal in Turkmeniya has now reached a million kilowatts. Builders from the Marygresstroy Administration have decided to accelerate the construction of two more power units and to bring the plant up to full capacity ahead of the target date. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 26 Dec 79 p 2] 11499

CAST POWER TRANSFORMER--Azerbaijan--A test specimen of a cast power transformer has been produced at the Baku Dry Transformer Plant. The new transformer is compact and has good mechanical strength. This is due to the fact that the winding surface in the new transformer is cast of epoxy resin and possesses excellent insulating properties. Steel and ferrous metal consumption has been cut considerably by reducing the dimensions of the new transformer. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 1, Jan 80 p 16] 11499

ATOMIC ELECTRIC POWER PLANT--Kiev Oblast--The first stage of the Chernobyl' Atomic Electric Power Plant has been completed and is operating at rated capacity ahead of schedule. Construction of the AES was completed in short time. For a long time the electric power plant has been operating at maximum output, 2 million kilowatts. The builders and operators have accepted a commitment to place the third power unit into operation next year and to have it operating at rated capacity ahead of schedule. The start-up of the republic's first atomic electric power facility has resulted in a more reliable electric power supply for the national economy and in a considerable fuel saving. [Text] [Moscow IZVESTIYA in Russian 26 Dec 79 p 1] 11499

CSO: 1822

UDC 622.014.2:338.5:658.012.2

NEW WAY TO PLAN COAL-MINE OPERATING COSTS TESTED IN UKRAINE

Moscow UGOL' in Russian No 10, Oct 79 pp 49-52

[Article by V. I. Malov, candidate of engineering sciences, of the Torezantratsit Association, V. Ye. Tarasenko, candidate of economic sciences, of USSR Ministry of Coal Mining Industry, and D. Ya. Tolkatser of DonUGI [Donetsk Scientific Research Institute for Coal]): "Use of the Factor Method for Planning Operating Costs"]

[Text] An exhaustion of reserves and a reduction in the amount of coal mined are characteristic of the Torezantratsit Association. During the past 10-15 years only one new mine, Progress, with a designed capacity of 1.8 million tons, has been put into operation, while 8 mines with a total annual output of 5.47 million tons of coal have been retired. The main indicators of the association's operations are shown in the table.

Indicators	1975	1976	1977	1978	1st 6 mos of 1979
Coal mined, thousands of tons.....	11,100.8	11,041.0	11,113.6	11,181.4	5,623.0
Realized output, thousands of rubles..	220,783	255,844	226,489	221,228	110,033
Wholesale price per ton of coal.....	10.83	10.87	10.69	10.85	9.05

The change in amounts of coal mined that is noted above inevitably leads to a worsening of indicators of the work of the mines and of the production association as a whole. In 1978 the coal mined was reduced by 1.14 million tons in comparison with 1970, its ash content rose by 4.5 percent, the workload per mine was reduced by 376 tons per day, labor productivity per worker engaged in mining was reduced by 1.5 tons per month, and the operating costs per ton of coal rose by 6.32 rubles.

This deterioration in indicators was occasioned by a number of objective factors. As the coal reserves more favorable for extraction were worked out, the miners began to develop seams that were at deeper horizons and were also substandard as to ash content and seam thickness. A problem of paramount importance--improvement in methods for controlling the process

of shaping the indicators--arose before the association. Special attention was paid to improving the planning of indicators, particularly of operating costs, which express in terms of cost the effectiveness of the work of the mine and the association as a whole. It was decided to develop jointly with DonUGI a method for planning coal-mining operating costs that would enable the most effective technical and organizational measures to be evaluated and selected for inclusion in the plan and for introduction into practice. The choice should be made at the stage of draft plan preparation; this presupposes a temporal linkup between development of the engineering program and the plan for the operating costs for mining coal. This will enable them to be coordinated and maximum benefit to be attained under the enterprise's specific working conditions.

The computation of operating costs by technical and economic factor is in accord to a great extent with the purposes indicated, which will make it possible: to raise the validity of the plan by considering in all possible ways the production activity's situation and by coordinating plan tasks with measures for developing and improving production; to discover and to consider in the plan the effectiveness of the scientific and technical achievements that are contemplated for introduction, improvements in organizing production and operations and other reserves within the production activity for reducing costs; and to evaluate the progressiveness of the draft plans that enterprises and associations make up.

The determination of change in the base level of operating costs as affected by change of the influencing factors contemplated by the operating plan was made the basis for computing operating costs by technical and economic factor. This computation will make it possible, at the stage of draft plan development, to determine the possible economic consequences of change in objective conditions and to evaluate the engineering solutions adopted.

Different methods were recommended for computing operating costs by factor for the mine and for the production association. The differences were occasioned by the fact that the consolidation that associations are allowed to make of evaluative characteristics that are determined on the basis of average conditions existing at the association's mines cannot be used in computing operating costs for an individual mine. Therefore, in order to evaluate the influence of the factors on the operating costs of production associations for mining coal, the computations are made by means of models from mathematical economics, using the methods of mathematical statistics, while the method of technical and economic computations is used for the mine.

As is apparent from chart 1, when computing operating costs for the association, the influence of a large number of factors is evaluated by means of regression models of relative values, and also by technical and economic computations.

In computing the operating costs by mine (chart 2), the more dynamic factors that affect operating costs are subjected to evaluation.

Chart 1

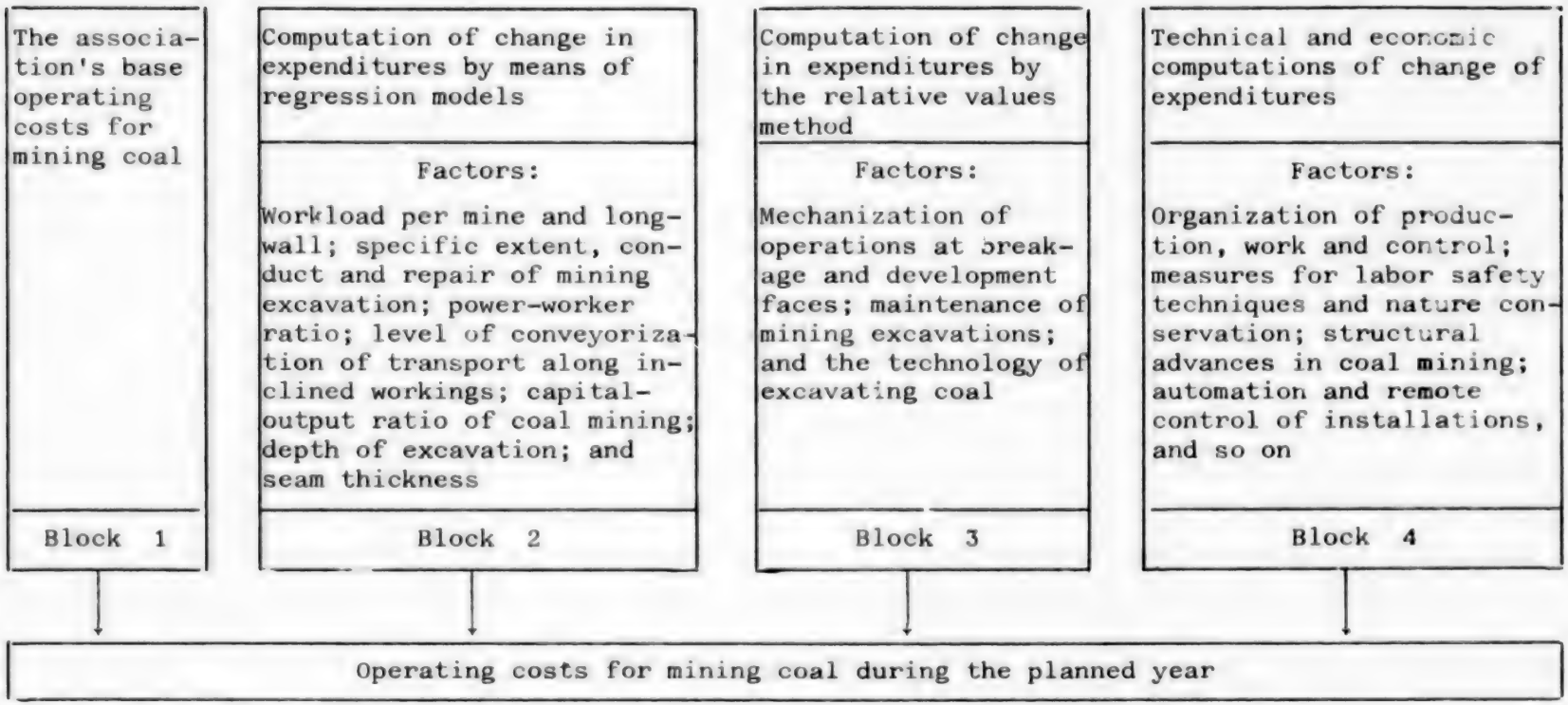
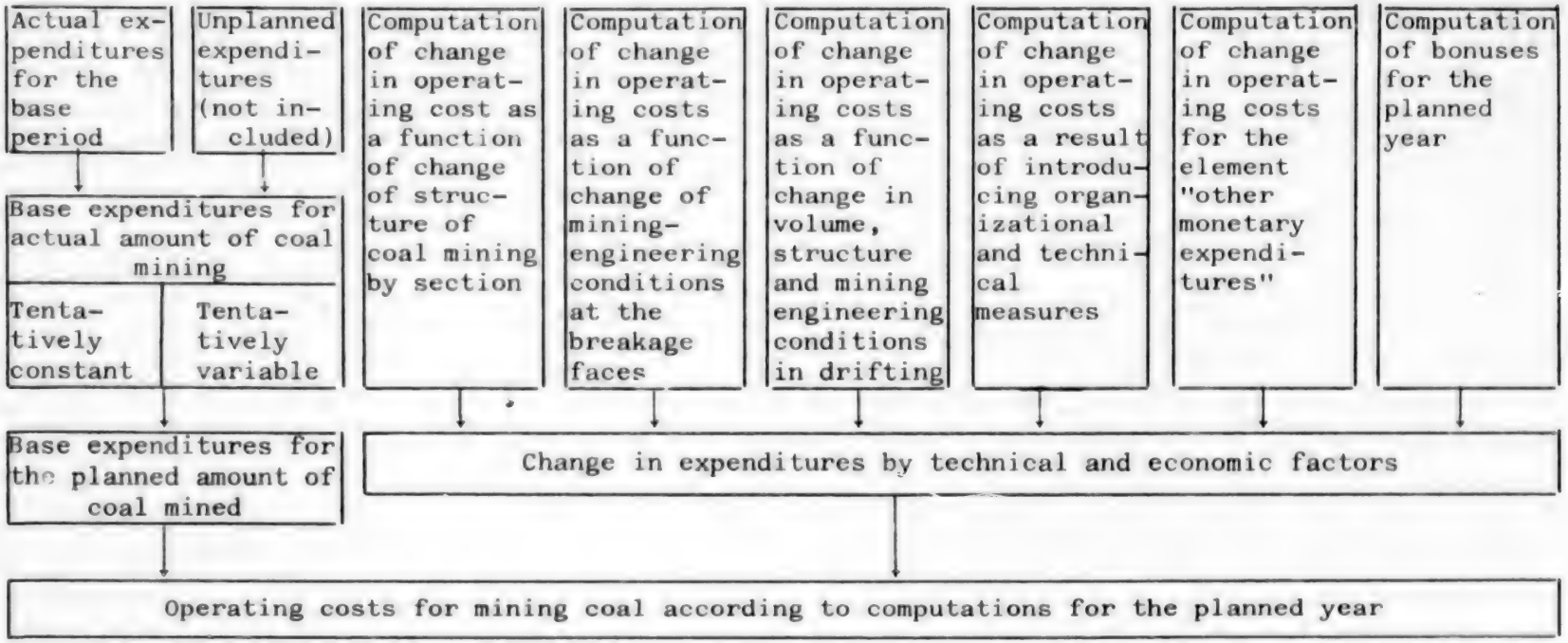

The association's base operating costs for mining coal
Block 1
Computation of change in expenditures by means of regression models
Factors:
Workload per mine and longwall; specific extent, conduct and repair of mining excavation; power-worker ratio; level of conveyorization of transport along inclined workings; capital-output ratio of coal mining; depth of excavation; and seam thickness
Block 2
Computation of change in expenditures by the relative values method
Factors:
Mechanization of operations at breakage and development faces; maintenance of mining excavations; and the technology of excavating coal
Block 3
Technical and economic computations of change of expenditures
Factors:
Organization of production, work and control; measures for labor safety techniques and nature conservation; structural advances in coal mining; automation and remote control of installations, and so on
Block 4
Operating costs for mining coal during the planned year

Chart 2


Actual expenditures for the base period
Unplanned expenditures (not included)
Computation of change in operating cost as a function of change of structure of coal mining by section
Computation of change in operating costs as a function of change of mining-engineering conditions at the breakage faces
Computation of change in operating costs as a function of change in volume, structure and mining engineering conditions in drifting
Computation of change in operating costs as a result of introducing organizational and technical measures
Computation of change in operating costs for the element "other monetary expenditures"
Computation of bonuses for the planned year
Base expenditures for actual amount of coal mining
Tentatively constant
Tentatively variable
Base expenditures for the planned amount of coal mined
Change in expenditures by technical and economic factors
Operating costs for mining coal according to computations for the planned year

A computation of coal-mining operating costs that take into account the influence of technical and economic factors should be performed: when developing long-range plans for the enterprise (for a five-year period or longer); when presenting drafts of annual plans to higher organizations; and when developing the enterprise's annual plan. An experiment that was begun in the second quarter of 1976 preceded introduction of the indicated method. Not only staff workers of the Directorate for the Economics of Associations but also workers of the mines' economic services took an active part in performing the experiment. The draft of the procedural rules for planning operating costs in the production association and at mines that was prepared by DonUGI was first discussed with workers of the Directorate for Economics. Instructional conferences on the procedure for computing operating costs by factor were held with the mines' planning services workers.

During the experiment, computations in accordance with the proposed procedures were carried out first at the base Zarya Mine, and then, after the results obtained were examined and the necessary corrections made, at all mines of the Torezantratsit Association. The results of the computations carried out at the mines were examined quickly at DonUGI and the Directorate for Economics. A detailed analysis of these computations for each mine enabled a number of procedural inaccuracies to be found in various portions of the draft. As a result, new computational tables were developed jointly with workers of the mines and the association, and the procedures for determining some indicators were refined. Maximum attention was paid during the experiment to the development of simpler methods for making computations for determining individual types of expenditures at the mines and associations, and to the refinement of the procedures for computing centralized expenditures for coal mining and for establishing control figures for the plan for operating costs by mine.

The results obtained enabled the experiments to proceed, and in 1977 the method for planning operating costs by technical and economic factor began to be used at all the association's mines. After final refinement of the new planning method, it was introduced in 1978 as the basic method for the association's mines.

Computations under the final variant of the new method for planning operating costs were performed by means of 10 tables and consisted of the following.

Stage I. The Determination of Base Expenditures. Unplanned expenditures and the total of bonuses of all types paid out are excluded from the actual expenditures for coal mining during the period adopted as the base period. Unplanned expenditures include the following: payment for work on days off and on holidays; actual expenditures for mining coal by engineering units that are shut down during the base period and are subject to shutdown during the plan period; amortization deductions for fixed capital that is to be written off during the plan period; actual expenditures for those types of expenses, the planning of and accounting for which are to be additionally centralized during the plan period; and

actual expenditures connected with the elimination of accidents (if they occur) that lead to a reduction in the mining of coal of the whole mine or of separate sections for 5 days or more, if these expenditures relate to coal-mining operating costs.

The base expenditures determined this way are differentiated as to tentatively constant and tentatively variable expenditures (for each element). Then the base sum of the expenditures for the planned volume of coal mining is figured. The computation is made in accordance with the formula:

$$З_{б.\,п.\,д} = З_{б.\,пост} + \frac{З_{б.\,пер}\, Д_{ш.\,п}}{Д_{ш.\,б}}, \qquad (1)$$

where $З_{б.\,пд}$ are the base expenditures for the planned amount of coal mining, in thousands of rubles; $З_{б.\,пост}$ and $З_{б.\,пер}$ are, respectively, the actual total (except for unplanned expenditures) for tentatively constant and tentatively variable expenditures during the base period, in thousands of rubles; and $Д_{ш.\,п}$ and $Д_{ш.\,б}$ are the amounts of coal mining by mine during, respectively, the planned period and the base period, in thousands of rubles' worth.

Stage II. Computation of Change of Operating Costs under the Influence of Production Factors. The effect of change in mining-engineering conditions on the execution, volume and structure of mining and development operations is evaluated by the elements "materials" and "wages with deductions for social insurance." In so doing, consideration is given to change in the piecework rate for excavating 1 ton of coal and the costs for doing 1 meter of development excavation, the norms for consumption of timber and explosives, taking into account the thickness of the seam and the type of mechanization for removing the coal and for doing development work.

Change in expenditures for materials and wages because of the influence of mining-engineering conditions at the breakage and development faces is computed according to the formula

$$\Delta З_г = \sum_{i=1}^{n} (З_{п_i} - З_{б_i})\, О_{п_i}, \qquad (2)$$

where $З_г$ is the change of expenditures as a result of change in mining-engineering conditions for operation, in rubles; $З_{п_i}$ and $З_{б_i}$ are the expenditures for the excavation of 1 ton of coal at the i-th mine face or the conduct of 1 meter of development work of the i-th type, respectively, during the plan and base periods, in rubles; $О_{п_i}$ is the amount of mining (or development work) in the planned period for the i-th breakage face (or type of development work), in tons (or meters).

The influence of the structure of coal mining and of the conduct of development work is determined by means of the formula

$$\Delta З_{ст} = \sum_{i=1}^{n} З_{б_i} О_{п_i} - \sum_{i=1}^{n} З_{б_i} О_{б_i}, \qquad (3)$$

where $\Delta З_{ст}$ is the change in expenditures as a result of change in the structure of coal mining or the conduct of development work, in rubles; $О_{б_i}$ is the amount of mining (or conduct of development) during the base period for the i-th breakage face (or the i-th type of development work), in tons (or meters).

The types, number and volume of organizational and technical measures contemplated for the planned period that are considered in computing labor productivity, the wage fund and the consumption norms for material resources, as well as the periods of their fulfillment, are adopted in accordance with the injunction about the plan for the production association's progress during the year.

The change in operating costs under the influence of organizational and technical measures are computed separately for each element. In so doing, the following procedure for the calculations is adopted.

1. By the element "wage fund." If as a result of the conduct of the measures, a change in the work force occurs that is considered during the calculation of labor productivity, then the change in expenditures for the wage fund is determined in accordance with the formula:

$$\Delta З_{з_n} = \Delta Ш_n T_n 1.4 B_n. \qquad (4)$$

where $\Delta З_{з_n}$ is the change in wage-fund expenditure as a result of conducting the n-th measure, in rubles; $\Delta Ш_n$ is the change in work force during conduct of the n-th measure, which is considered in the computation for labor productivity, in persons; T_n is the average wage scale per worker who participates in conduct of the n-th measure, in rubles; 1.4 is the coefficient that considers additional wages; B_n is the average annual number of days off per worker who participates in the n-th measures, in man-days.

According to this method, the influence on wage-fund expenditures of such measures as automation and the conversion to remote control of stationary machines and mechanisms, improvement of coal-excavating technology, improvement of the scheme for hauling and for the conveyorization of transport, the introduction of advanced methods for organizing work, the degasifying of seams, and so forth, is evaluated. In so doing, only the

direct change in the number of workers, not counting provisional releases as a result of increasing the loading per mine or per longwall, is considered.

If it is necessary to evaluate the influence on wage-fund expenditures of organizational and technical measures to introduce new equipment for mining and development work that were not considered during evaluation of the effect of change of expenditures for mining and development operations, then the change of these expenditures is determined in accordance with the formula

$$\Delta З_{з_n} = (R - R_0)\left(1 + \frac{d}{100}\right) O_n, \qquad (5)$$

where R_0 and R are the ratings per unit of output (tons or meters), respectively, before and after conduct of the n-th measure, in rubles; d is the average percent of additional wages for the given category of workers; and O_k is the amount of work to be done from the time the n-th measure is introduced until the end of the year (in tons or meters).

2. By the elements, "materials," "fuel," "electricity" and "depreciation." The introduction of organizational and technical measures is accompanied by a change in the material-resources consumption norms and the norms for amortization deductions. The change in expenditures for materials resources is determined according to the formula

$$\Delta З_{jn} = (N_j - N_{0j}) P_{0j} O_n. \qquad (6)$$

where $\Delta З_{jn}$ is the change in expenditures for the j-th element as a result of the conduct of the n-th measure, in rubles; N_{0_j} and N_j are the consumption of material resources of the j-th kind per unit of output (tons or meters) before and after conduct of the n-th measure (cubic meters, tons, kw/hr, kg, and so on); and P_{0_j} is the price per unit of material resources of the j-th kind prior to conduct of the measure, in rubles.

Change in expenditures for depreciation is determined by a comparison of the total amortized deductions prior to and after conduct of the measures, in accordance with the formula

$$\Delta З_{а_n} = (A_n B - Б_n B_0)\frac{M}{12 \times 100}, \qquad (7)$$

where $\Delta З_{а_n}$ is the change in expenditures for amortization through conduct of the n-th measure, in rubles; A_n and $Б_n$ are, respectively, the cost of

the newly introduced and the previous fixed capital during execution of the n-th measure, in rubles; B_0 and B are the average annual norm for amortization of, respectively, the previously and the newly introduced capital, in percent; and M is the number of months from the time of introduction of the n-th measure until the end of the year.

3. By the element "other monetary expenditures." Change in expenditures for this element is found as the difference between the total expenditures according to the budget estimate for the plan year and the base expenditures for each article.

4. By expenditures for awarding workers' bonuses. The bonus fund for workers' wages for the plan year is computed as the product of the planned workers' wage fund, not counting compensation for length of service, times the fraction of bonuses of the planned workers' wage fund for the base period.

All the computations of the second stage are carried out by means of seven tables, the results of which are reduced to a special form.

Stage III. Determination of Operating Costs for the Planned Year. The complete expenditures are computed as the algebraic sum of the base expenditures for the planned amount of coal mined (stage I) and a specific computation of the amount of change in expenditures by technical and economic factor (stage II).

One copy of the computation for the mine's operating costs is sent to the association's Planning Section. Here each computed table is examined jointly with staff workers of the Directorate for Production and the Engineering Directorate. In so doing, the correlation of the technical indicators that were adopted in the operating-cost computations for the mine with the indicators that were established for the given mine by the draft production plan are monitored. If the mine has not considered completely the indicators of the engineering program of the association, then the latter's workers are supposed to introduce the appropriate corrections into the operating-cost computations.

One of the important tasks that was solved during the experimental introduction of the described method in the Torezantratsit Association was that of developing a procedure for establishing control figures for operating costs (the plan) for the year by mine. It is done as follows. On the basis of a computation by technical and economic factor that was carried out by the association's Planning Section, operating costs per ton of coal and total expenditures for the planned volume of coal mining for the association as a whole are determined, taking into account the control figure established by UkSSR Minugleprom. Simultaneously, a computation is made of the plan total for all types of expenditures that are centralized in the association. The difference between the total sum of the association's expenditures for coal mining and the centralized expenditures is the control figure for the mines for the planned year.

The results of the computations of operating costs by technical and economic factor that the mines present to the association are summed up and the computed expenditures for the planned amount of coal mined per given mine are determined. If the computed expenditures coincide with the control sum set by the association, then the results of the computations for operating costs by technical and economic factor are adopted as the plan operating cost for coal mining (the control figure) by mine for the year. If the indicated sums do not coincide, then additional analysis of the computations that the mines presented is made. In so doing, the amounts and the effect of introducing new equipment for breakage and development faces and other measures that were considered in the operating-cost computations are compared with the corresponding indicators that were reflected in the computations for the association. On this basis, the computations for each enterprise are refined, after which the control figures for the operating costs for mining coal are established by mine for the year.

The control figures for operating costs by mine are worked out by means of eight tables, two of which are cumulative and allow total expenditures of the mines for the planned year to be determined in accordance with the computations by technical and economic factor. Three tables are used to compare the amounts of work and of change in expenditures as a result of introducing and expanding the use of highly productive equipment at breakage and development faces that was assumed in computing operating costs by mine and in computing this indicator for the association as a whole. One table serves to refine completeness of consideration, when computing operating costs by mine, of the effect of the measures that the association called for and that were aimed at improving the organization of production, work and control, automating stationary facilities, improving technology, and so on. This same table is used to determine the plan for the annual total expenditures for coal mining by mine by separate element.

The distribution of plan expenditures for each mine for the tentatively constant and tentatively variable expenditures (by element) is done with a special table. This distribution is necessary for establishing quarterly plans. The plan for operating costs for coal mining for the year by mine, with a grouping of expenditures by element and by their distribution by quarter, is cited in a summary table.

After receiving from the production association the plan for operating costs for mining coal for the year and after figuring the quarterly plan by month for the mine as a whole, the mine's workers undertake to compile monthly plans for sections, departments and services and for the mine.

The 1978 plan for operating costs for coal mining by mine of the Torezantratsit Association was established on the basis of computations by technical and economic factors. In 1978 the expenditures for mining coal were reduced in comparison with the plan by 1.4 percent, while the plan for mining coal was met by 102.1 percent. Out of 17 mines of the association, the plan for operating costs was not fulfilled by 5. In the first 6 months of 1979, expenditures were reduced by 3 percent while plan

fulfillment for mining was 106.4 percent, and 3 mines did not fulfill the plan for operating costs.

Experience in use of the procedure for planning operating costs that is set forth above has indicated that it is possible, based upon computations by technical and economic factor, to organize effective, ongoing monitoring over operating costs and control over the process for formulating them. This method makes it possible to concretize the responsibility of individual engineering services officials for increased outlays for coal mining.

Computations of operating cost by technical and economic indicator also make it possible to correlate this indicator for the plan period with the indicators for the engineering program, to determine possible change in operating costs for each of the factors being considered and for groups thereof, and to influence the choice and extent of organizational and technical measures that will provide at the plan development stage for the lowest level of operating costs.

The advantages of the method for computing coal-mining operating costs by factor has been revealed in the operation of the association's mines. The motivation of the engineering services toward the economic consequences of the engineering measures they worked out has been raised. The breakdown of basic operating processes (for coal extraction and for development work) at all stages of plan compilation enabled the discovery of reserves for reducing expenditures directly during the mining of coal and the conduct of development work. The discovery of reserves for reducing expenditures for other operating processes was made possible by the method of evaluating the effect of the organizational and engineering measures contemplated.

This method of planning operating costs will allow the engineering services to be directed toward a search for solutions aimed at reducing costs, primarily of those production processes that are comparatively costly. Its use will also enable analysis of fulfillment of the plan for operating costs to be improved considerably. For this purpose, changes must be made in the procedures now used to analyze operating costs. This task is now being resolved by Torezantratsit Association and DonUGI workers.

The experience also indicated that the method developed will enable computations for planning operating costs to be mechanized. Association and DonUGI workers face the task of insuring, by the end of the Tenth Five-Year Plan, that all computations for planning operating costs are made on electronic computers. Help from the UkSSR Minugleprom [Ministry of Coal Industry] GVTs [Main Computer Center] is necessary for this.

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CSO: 1822

UDC [622.232.8+622.232.83]:622.012.2(477.61/.62)

DETAILS OF NEW EQUIPMENT FOR UKRAINE'S COAL MINES

Moscow UGOL' in Russian No 10, Oct 79 pp 41-46

[Article by Candidate of Technical Sciences A. I. Bashkov (Dongiprouglemash [Donetsk State Design-Development and Experimental Institute for Coal Machinery Manufacture]): "Dongiprouglemash's Developers Are Working for Donbass [Donets Coal Basin] Miners"]

[Text] In the Donets Coal Basin the main coal-production entities are being equipped with machinery constantly and at an increasing pace. By the end of 1978 more than 500 longwalls, 48 of them based on steep seams, had been equipped with mechanized roof supports. The level of mining from gently sloping longwalls (less than 35 degrees) equipped with comprehensive mechanization rose to 57.8 percent, and of mechanized mining at steep and inclined seams to 34.9 percent.

Dongiprouglemash's developers, in creative collaboration with miners, machinebuilders and workers of other design-development and scientific-research institutes, are creating highly productive machinery and equipment for the mechanization and automation of labor-intensive operating processes.

During the Tenth Five-Year Plan Dongiprouglemash has developed and sent to series production 26 types of new complexes of equipment, machinery and devices for the coal industry. Most important of them are the ANShch tunneling unit, A70M and KU-6 (KND) cutter-loaders, 3LN-80 and 2LB-120 conveyors, PZP, PZK and Titan pneumatic gobbing complexes, EDKO-4, EDKOF-4 and EDKO-3 and 5-40 electric motors, TShchG pushers, and other equipment. The national economic benefit from introducing new machines of Dongiprouglemash design that can be attributed to the institute in 1976-1978 was 20.8 million rubles. Design documentation was developed for the series production of 50 types of new machines and equipment (the Donbass continuous miner with modernized roof supports, VOD-50 and VTs-31.5P fans, a car-raising platform, the 2ShP hose pickup, and other items) and for the fabrication of test models and test runs of 67 types (AK, KG and KD-80 continuous miners, KU-10 cutter loaders, B68-KP and B100-200 drill rigs, VTsD-31.5P fans, mine-head cage stabilizers, and other items). During this same period 75 new types of machines, equipment complexes and devices were fabricated and 56 types tested.

The breakage face is the main entity that determines the level of all technical and economic indicators of underground mine work. Therefore, an intensification of breakage work, the introduction of new equipment, and improvement of the technology constitute the main areas of technical progress in the coal industry.

In the Donets basin 60 percent of the coal is being mined from thin seams less than 1.2 meters thick, 50.7 percent of them being gently sloping seams, 9.3 percent steep seams.

KM-87 mechanized continuous miners, which have proved themselves well, are being used widely now to excavate gently sloping seams more than 1.2 meters thick.

Where thin gently sloping seams less than 1.2 meters thick are being worked, where the miners' work is heavier and poorly productive, serially produced KMK-97 and Donbass continuous miners, with 1K-101 and MK-67 cutter loaders, are being used, In 1978 these continuous miners produced 33.6 million tons, 11.2 million tons of which were mined by Donbass continuous miners.

In 5 months of 1979 the average daily workload per longwall was 554 tons for longwalls equipped with KMK-97 continuous miners, and 501 tons for those equipped with Donbass units.

An average daily output of 1,000 tons or more was achieved at 17 longwalls at Donbass mines where KMK-97 and Donbass continuous miners were operating. In 1978 all the increase in mining from longwalls with comprehensive mechanization (3.5 million tons) was obtained as a result of the use of these machines. However, the introduction of these two continuous miners does not solve completely the problem of comprehensive mechanization of excavating thin seams. Wide-front cutter-loaders and narrow-front equipment with individual roof supports are still being used at thin seams with unstable side walls and false roofs.

Design-development work now is being done that is aimed at expanding the area of use of continuous miners and at modernizing the equipment that is essential for such seams. The modernization of the Donbass continuous miner can be cited as an example. One of them--the Donbass-2--is now being operated successfully at the Mine imeni 60-Letiya Sovetskoy Ukrainy (of the Pervomayskugol' Association). A seam 1.15 meters thick with a bedding angle of less than 30 degrees and a contact roof--unstable shale less than 0.3 meter thick--is being excavated. Previously the Temp cutter-loader, with individual roof supports, worked this seam, and the daily load per longwall here did not exceed 280-300 tons. With operation of the Donbass-2 continuous miner, the daily workload in some months reaches 1,000 tons and more. Labor productivity has been raised 1.6-fold, and the coal's production cost has been reduced 1.5-fold.

The Druzhkovka Machinebuilding Plant will convert in the near future to the manufacture of Donbass roof supports, which call for control from a

neighboring section and side protection of the sections from collapsing roof rock where the bedding angles of the seams are more than 20 degrees. The supports will insure effective excavation of seams with bedding angles of less than 35 degrees.

In recent years Dongiprouglemash has created the KD-70 continuous miner (figure 1), which is intended for full mechanization of the processes of digging, loading and delivering coal and for strengthening and controlling the roof at faces with flatter seams 0.8-1.2 meters thick, with bedding angles of less than 35 degrees and with unstable wall rock. The continuous miner will enable the excavation of niches and the strengthening of the junctions of the longwall with the gallery to be mechanized.

Figure 1. The KD-70 Continuous Miner.

Support sections of the KD-70 roof supports are advanced following excavation of the coal by the cutter-loader without loss of contact of the support cover with the roof, they are controlled from a neighboring section, the load-carrying capability of the posts has been raised to 40 tons-force, and a mechanism that will provide for moving the sections strictly along the axis is called for.

The KA-72 cutter-loader of the continuous miner has working implements that are placed along the ends of the machine, and it performs notching without the preparation of niches.

In 1977 industrial tests of the KD-70 continuous miner were completed at the Yubileynaya Mine of the Pavlogradugol' Association, at which a seam 0.78-0.85 meter thick was being excavated. The complex mined about 150,000 tons of coal, and the breakage face was advanced more than 750 meters. In January 1978 it mined 16,700 tons of coal, and the maximum daily output reached 900 tons (the estimated daily output when excavating a seam 0.8 meter thick is 550 tons).

The design documentation for manufacturing a test lot of KD-80 continuous miners was amended in the fourth quarter of 1979.

Dongiprouglemash has developed equipment for the highly productive Dolzhanskaya-Kapital'naya Mine, which has an average daily workload of 14,000 tons of anthracite. The seams will be worked by long bores (up to 3,500 meters), with longwalls excavated along the dip (or rise). The coal should be mined by four longwalls with a workload of 3,300 tons per day

each. An excavating section 250 meters long is prepared by means of three conduits--one middle conduit and two side conduits.

Automated AK excavating cutter-loader continuous miners controlled by operators located in the conduits are to be used at the longwalls (figure 2). Full conveyorization for transporting the rock mass from the breakage and development faces to the main bore is called for. The AK automated excavating cutter-loader continuous miner, the Soyuz-19 drifting continuous miner, and the 2LT-100, 2LU-160 and 1LTP-80 belt conveyors, as well as equipment for the mine's surface activity, have been developed by Dongiprouglemash with the participation of Donavtomatgormash [Donetsk Institute for the Design of Automated Mine Machinebuilding], Giprouglemash [State Design-Development and Experimental Institute for Coal Machinebuilding], the VNPO [All-Union Science and Production Association] Uglemekhanizatsiya and other organizations.

Figure 2. The AK Continuous Miner.

The AK continuous miner is intended for seams 1-1.4 meters thick with bedding angles of less than 10 degrees and a coal-cutting resistivity of up to 300 kg-force/cm. It includes 2 AKV or K-200 narrow-front cutter-loaders, AKL automated longwall roof supports, the AKB berm roof support, KSA-17 and KSA-14 supports for joining the longwall with galleries, the SP-205 scraper conveyor, electrical (1,140 volts) and hydraulic (an operating pressure of 32 MPa) equipment, a system of dust suppression, and apparatus for automating auxiliary equipment. The miner's design productivity where seam thickness is 1.17 meters is 10 tons per minutes, its workload per breakage face is 3,300 tons per day, labor productivity per breakage face worker is 116 tons per shift, and the power-worker ratio is 1,600 kw.

All the main operations have been automated, enabling the continuous miner to operate without the constant presence of people at the breakage face. Special sensors help the operating equipment to follow the "rock-and-coal" boundary constantly, and thus a nominal workload for the electric motors is provided for.

A system for automatic roof-support control provides for advancing the support at once after the cutter-loader moves. The AK continuous miner is being tested at the Mayak Mine of the Sverdlovantratsit Association. The first results of its test, after tune-up work, confirmed the rationality of the design solutions incorporated in it. A higher loading--1,110 tons

of coal per shift--was achieved under a work mode of one mining shift and one repair shift for a section. Substantial work is to be done on further test of the complex and on analyzing the breakdown of functions and the operational scheme for a section.

The Soyuz-19 continuous-miner tunneler is intended for excavating rock with a strength $f \leq 8$ on Professor M. M. Protod'yakonov's scale, with a tunneling cross-section of 18.6 square meters and inside cross-section of 12.6 square meters. The complex provides for the mechanized destruction of the rock, loading and shipment of the rock mass, and the support work for horizontal and inclined (up to $\pm$ 10 degrees) development excavation. It can be used for mines with gas and dust hazards, and for work on rocks of average and higher-than-average strength.

The combine's high power-worker ratio (total installed power is 850 kw) and the progressive design solutions incorporated in it provide for excavating at the rate of up to 10 meters per shift (the cutter-loader's maximum operating productivity is 2.6 meters per hour).

The cutter-loader can operate in a semiautomatic mode and is supplied with devices that provide for automatic adjustment of feed speed as a function of the loading on the motors and for monitoring the machine's position during excavation.

A test model of the Soyuz-19 complex made by the Yasinovataya Machine-building Plant has been tested at the Mine imeni Stakhanov of the Krasnoarmeyskugol' Association.

At a depth of 800 meters the machine did 1,000 meters of fringe drifting, tunneling 19.6 square meters in cross-section in rock of $f \leq 9$ strength.

In so doing, a record was achieved for domestic coal industry productivity--a daily productivity of up to 22 meters and a shift productivity of up to 8 meters.

Based on the results of the tests, a decision was adopted to create a unified series of tunneling complexes for the coal and other branches of industry, based upon the Soyuz-19 continuous miner.

The 2LT-100 (and 2LBT-100) telescoping belt conveyors are intended for receiving rock mass from the breakage-face conveyor, which is shifted periodically, and for transporting the rock over straight-line mine workings with angles of inclination of -12 to +10 degrees that are directly adjacent to the longwalls. It can be used in coal and shale mines that have gas or dust hazards. The conveyor's productivity is up to 850 tons per hour, and the power capability is 500 kw.

It is the base model for conveyors with a belt width of 1,000 mm that are assembled from unified components, and it is the first telescoping conveyor with cable support that transports the rock mass upwards from below. It

has greater telescoping capability and length of transport and higher productivity than other telescoping conveyors.

A test model of the 2LT-100 conveyor is being operated successfully at the Mayak Mine of the Sverdlovantratsit Association.

The 2LU-160 belt conveyor is intended for transporting rock mass along main inclines and inclined bores (with angles of inclination of +3 to +18 degrees) of coal and shale mines that have gas or dust hazards. It can provide for the delivery of rock mass in mines with a production capability of 20,000 tons per day.

The conveyor has basically new elements: a control element based on thyristors, an easily detachable toothed clutch, a loading device with speed arrestor, a V-shaped conveyor support, a bolt-free attachment of the roller support, and other features.

The great power capability (1,500-2,000 kw) at higher belt speeds (up to 3.15 meters per second) and its much greater width (1,600 mm) provide higher conveyor productivity (up to 2,300 tons per hour). The belt speed can be adjusted to depend upon the loading.

The continous miners and belt conveyors created for highly productive mines have no equal in the coal industry. The successful introduction of them and of other machines enables labor productivity to be greatly increased and the level of comprehensive mechanization of coal mining to be sharply raised.

The level of mechanization at steep Donbass seams lags greatly behind what has been achieved at the flatter seams; this is explained by a large number of factors. The bedding region of the Donets Coal Basin's steep seams is very complicated in its geology, it has a large number of tectonic dislocations, and 59 percent of the seams have unstable wall rock.

The thickness of the seams being worked varies from 0.4 to 2.2 meters. Almost all the seams have gas hazards, and the deeper the excavation the more gas that is present. The number of seams with pressure-bump hazards is increasing, and, moreover, many seams are self-igniting.

The problem of providing comprehensive mechanization for excavating steep seams was solved in two ways: first was the use of equipment and methods of excavation that had already proved themselves well on the flatter seams; and, second, the creation of basically new equipment, taking into account the specifics of steep seams (tunneling units that work in wide belts along the dip of the seam, and machines for unmanned excavation).

In implementing the first course, instead of the serially manufactured Temp cutter-loaders, Dongiprouglemash developed the Smena (KND) cutter-loader in two sizes (the KU-6 for seams 0.7-1.1 meters thick, and the KU-10 for seams 1.1-1.8 meters thick) that operate from the seam's footwall without a special vehicle road. The cutter-loader is marked by a

higher energy potential, improved operating-implement design, the presence of a special loading chute for transporting coal along the chassis, and the potential for operation in a continuous miner with a flexible chute support. These qualities of the new cutter-loader will enable it to be used on seams with bedding angles of 30-90 degrees, not only in a one-way scheme but also in a shuttle scheme, to excavate coal along the entire length of a longwall without the preparation of niches, to break down strong coal with rock interlayers and hard inclusions effectively, to cut wall rock where there is local tapering of the seam, and to preclude completely labor-intensive manual operations on footwall trimming and the assembly and disassembly of chutes after each coal-excavating cycle at steep seams. The Smena cutter-loader is intended for use with both individual and mechanized roof supports at seams 0.7-1.8 meters thick. Control of the cutter-loader and the winch is remote.

Smena cutter-loaders of the standard KU-6 size have been produced serially since 1978, and test models of the KU-10 size cutter-loaders are undergoing test.

The A-70 cutter-loader, which replaces the Komsomolets, which has been produced up until now, has been created and is being manufactured serially to excavate coal at seams 0.45-0.8 meter thick. It is being manufactured in pneumatic and electrical versions, and it works on the one-way scheme, upwards from below, from the seam's footwall, without a special vehicle path. The A-70 combine can be used jointly with individual roof supports or in a continuous miner with mechanized supports.

The KU-16 size cutter-loader, which is used in a continuous miner with mechanized supports, is being created for work on thick (1.6-2.2 meters) steep seams. An experimental model of it was fabricated by Dongiprouglemash's experimental plant in 1978.

As a result of carrying out work in the second direction, a number of tunneling units (the AShch, the AShchM and the ANShch in two standard sizes) and the KMD-72 continuous miner for unmanned excavation were created.

The introduction of the tunneling units, as experience in this operation has shown, will enable mine sections with especially complicated conditions to be worked: seams with rock outburst hazards (without the use of special protection measures) and seams with roofs that are difficult to control.

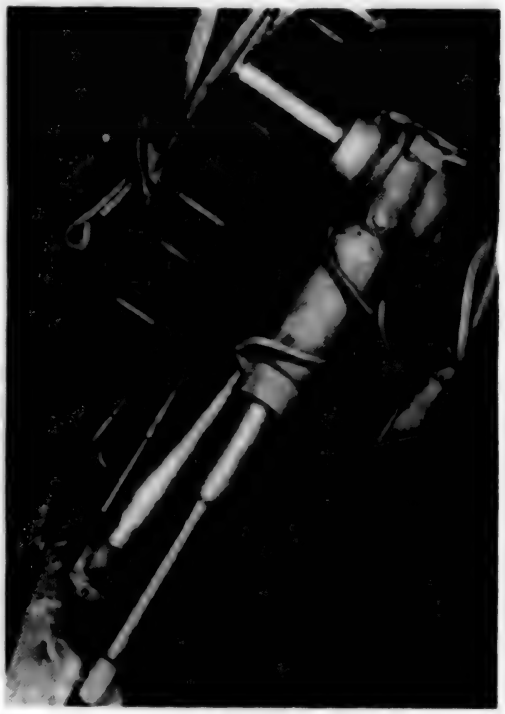
The use of tunneling excavation is advantageous economically, since, with the introduction of tunneling units, it has become possible to work coal reserves (about 22 million tons) that previously had been left because of a lack of the necessary mechanized equipment.

The excavation of seams with rock outburst hazards by tunneling units simultaneously provides protection for other seams, the development of which by longwalls under existing technology requires substantial consumption of materials for antirockbust measures.

With the use of tunneling machines, the sanitary and hygienic conditions for the miners at work are sharply improved and work safety is bettered. These units have proved themselves positively in operation at many Donbass mines. Since 1971 the Druzhkovka and Gorlovka machinebuilding plants have been serially producing AShchM (and AShch) type tunneling machines. On 1 June 1979 the number of breakage faces equipped with these units had reached 36, and mining from them had risen 2.1-fold over the 1975 level.

Work is being done to introduce the ANShch tunneling unit (figure 3) for thin steep seams 0.7-1.3 meters thick, and also to test a second standard size of this type unit, which eventually will replace the AShchM unit at seams 1.1-2.2 meters thick.

Figure 3. The ANShch Tunneling Unit.



The main features of the ANShch unit are constant maintenance of the critical space at the breakage face with a high coefficient of roof support slab (up to 0.9) with positive joint advance of sections; and the wide critical space at the breakage face that is formed, which provides for reliable ventilation and servicing of the unit.

The level of mechanized mining by tunneling units at mines of the Donbass's Central Region was 16.5 percent on 1 January 1979.

Moreover, Dongiprouglemash, DonUGI [Donetsk Scientific-Research Institute for Coal], Avtomatgormash [Institute for the Design of Automated Mine Machinery] and other institutes are doing work to create a unified tunneling unit for steep seams 0.7-2 meters thick with full mechanization of coal excavation and roof support work, including work in niches and blind shafts.

Tunneling excavation at steep seams is one of the main areas of comprehensive mechanization. The main efforts of scientific-research and design organizations, operations personnel and machinebuilders should be focused on introducing it and on improving the technology for mining and the design of units.

Dongiprouglemash is creating, jointly with DonUGI and Avtomatgormash, the KG continuous miner for excavating steep seams 0.7-1.1 meters thick with weak wall rock. A potential for doing this work in an automated mode is

to be provided for. The distinguishing features of the continuous miner are: kinematic tie of the cutter-loader with the support; the capability to work where there is weak wall rock; a high coefficient of roof support slab for the wall rock (up to 0.9); the remote control of roof-support sections; and reliable protection against crumbling rocks.

One of the directions of integrated mechanization of coal mining at steep seams is the excavation of coal by chambers a full story in height without the presence of people at the breakage face, by means of the KMD-72 continuous miner. Test models of the complex (four machines) have been fabricated.

Tests of one complex (two machines) have started at the Surtaikha Mine of the Prokop'yevskugol' Association, and tests of another should be conducted at the Mine imeni A. I. Izotov of the Artemugol' Association.

Dongiprouglemash is doing work to create means for mechanizing the processes of full gobbing of space that has been worked in coal mines (the PZP, PZK and Titan-1 complexes).

The PZP pneumatic gobbing complex is intended for preparing the gobbing material (from mine rock and rock from tailings) and for gobbing it pneumatically into the worked-out space. The complex can be used at mines of any gas or dust category that are excavating seams at least 0.8 meter thick with bedding angles of 0-25 degrees, where there is roof control by full gobbing of the worked-out space and mechanized excavation of the coal by cutter-loaders and by overhead cutters with individual roof supports, or of excavation by continuous miners equipped with special roof supports and a breakage-face gobbing pipeline.

The PZP complex has crushing and grading equipment that prepares the material to be gobbed, and a pneumatic gobbing machine provides for feeding the material uniformly in a pressure pipeline, over which it is transported by compressed air to the place of erection of the gobbed massif in the worked-out longwall space. The crushing and grading equipment includes a KLP-1 grader-feeder, a ShchD-2 jawbreaker crusher, a PKK rock hammer-mill-grader, and a single-shaft DO toothed-disk crusher. The complex uses a drum-type PZB pneumatic gobbing machine. Moreover, the PZP complex also includes serially produced equipment (conveyors, feeders, tippers, pushers and so on) and auxiliary equipment (hoppers, ladders and so on).

Technical data for the complex: productivity in preparing gobbing material is 100 cubic meters per hour; the strength coefficient of the rock processed is $f \leq 12$ (on Professor M. M. Protod'yakonov's scale); the daily volume of rock processed and gobbed (in 18 hours of operation) is 1,200 cubic meters; maximum gobbing productivity is 200 cubic meters per hour; and maximum relative distance of pneumatic transport of the gobbing material is 500 meters.

An industrial-test model of the complex was tested at the Mine imeni Gor'kiy of the Donetskugol' Association. The Yasinovataya Machinebuilding Plant has mastered serial production of this complex.

The PZK pneumatic gobbing complex is intended for a mine of any gas or dust category that is excavating steep seams and uses full gobbing of worked-out space for roof control, and also for mines with flatter seams that use partial gobbing by rubble strips. The complex uses those same new machines that were in the PZP complex, except that it uses the pneumatic two-chamber DZM2 gobbing machines instead of the PZB machine.

The technical data of the two complexes are similar but the PZK complex's maximum relative distance for transporting gobbing material is 1,500 meters. Industrial-test models of the PZK complex were tested at the Mine imeni M. I. Kalinin and the Mine imeni A. I. Gayevyy of the Artemugol' Association. The Yasinovataya Machinebuilding Plant has mastered the serial production of the complexes.

The Titan-1 crushing and gobbing complex equipment is intended to mechanize crushing, pneumatic transport and gobbing of rock in an adjacent worked-out space during the conduct of seam development mining excavation, following a longwall.

The complex is being used in development excavation with an inside cross-section of at least 7 square meters for seams at least 0.5 meter thick. It can be used in mines of any gas or dust category where the rock hardness is f $\leq$ 10 on Professor M. M. Protod'yakonov's scale and the abrasiveness indicator value is less than 35 mg.

The complex includes a Titan-1 pneumatic crushing and gobbing machine, a VP-70 advancing ventilator, a gobbing pipeline and mobile distribution point with electrical equipment, and also serially produced equipment: a rock-loading machine of the bucket type (PPN-5) or with raking arms (1PNB-2, 2PNB-2 or other type), and a belt reloader (UPL-3, PPL-4 or other type).

Technical data of the complex: productivity is 20-60 cubic meters per hour, transporting distance is 80 meters, and gobbing density is 0.75 of the value of the density of the rock in the massif.

A test model of the complex was tested at the Trudovskaya Mine of the Donetskugol' Association, where it was left for further industrial operation.

The use of the complex in ventilation passages of the mine has enabled gobbing work to be completely mechanized, labor productivity to be more than doubled, drifting-brigade manning to be cut from 65-68 to 26-34 persons, expenditures for making and maintaining the passage to be reduced, and the pace of excavation and loading at the breakage face to be increased (from 2,200 to 3,200 tons per day).

One of the more important problems is that of mechanized excavation in strong rock (with a strength coefficient of f = 8 or more). The overall level of conduct of developmental excavation by entry-driving and through-cut cutter-loaders was about 23.8 percent during the first half of 1979 at UkSSR underground mines and should be brought up to 35 percent in 1980.

Therefore, very important tasks on creating equipment for the comprehensive mechanization of mining excavation that will provide for mutually coordinated performance of the main operations of the drifting cycle (destruction, loading and shipment of rock, and roof-support work) face scientific and design-development organizations.

The Strela-68 machine was created by Dongiprouglemash, its serial production has been mastered, and it is being used widely for uphill excavation 1 meter in diameter, in rocks with strength of $f \leqslant 12$.

The Gorlovka Machinebuilding Plant imeni S. M. Kirov has mastered the serial production of these machines. The machine's design is now being modernized.

Beginning in 1980 it is planned to master the serial output of the modernized Strela-77 machine, which will be able to do both slanted and uphill excavations up to 100 meters long. The machine will be produced with electrical and pneumatic drive.

The KRT rotary drifting cutter-loader for strong rock, which has been developed on the basis of the TOP and Yasinovataya cutter-loaders, is now being created. The KRT cutter-loader was designed to perform horizontal and slanted ($\pm$10 degrees) arch-shaped developmental excavation with a drifting transverse cross-section 16.4 square meters in area through rock of $f \leqslant 8$ hardness, and to master sections of increased strength ($f \leqslant 10$) in mines that have gas and dust hazards but not sudden-blowout hazards.

It is economically desirable to use this cutter-loader for doing underground or mixed excavation work over a distance of at least 800 meters. In so doing, the potential for excavating at least 2,000-2,500 meters per year by the cutter-loader should be provided for at the mine.

The cutter-loader works by breaking (shearing) rock off from the face's surface with tangential cutters that are installed on the operating implements and on two berm implements. The latter impart to the circular excavation an arch shape that is convenient for operations.

All the power operations (except for rotation of the operating and the berm implements) are performed by hydraulic devices. The cutter-loader is moved along the excavation by a hydraulic thrust-stepping device, the broken-up rock is transported along the cutter-loader by a special belt conveyor, and the cutter-loader is driven along the prescribed configuration in the vertical and horizontal planes by hydraulic jacks for turning and lifting the rear support. Excavation is guided by a laser device.

In order to reduce dustiness of the air, a dust-catching installation and a sprinkling system are called for. The excavation is supported by a three-element archlike support made of special metal sections.

A test model of the KRT cutter-loader is being fabricated by Dongiprouglemash's experimental plant and the Yasinovataya Machinebuilding Plant.

Much work is being done at the mines to drill service holes for various coal-mining purposes: for degassing, ventilation and water-drainage, for laying service lines, for lowering materials, for making blind shafts and ramps, for cutting longwalls and so on. Various drilling machines that often were borrowed from other branches of industry and did not, in practice, meet operating requirements, especially for seams that presented a blowout hazard, were used until recently in the coal industry to carry out these operations. Therefore, last year Dongiprouglemash created a number of drilling and cutting machines that mechanized these processes. They include, in particular, the OBSh-2, BIK-2 and BIP-2 drill rigs and the Start drilling machine. The designs of these machines were refined for serial production, and most of them are being manufactured by coal-machinery manufacturing plants.

One of the latest machines of this group is the B-68KP machine for drilling steep seams. It was designed to drill holes 300-400 mm in diameter up to 160 meters long in coal in an uphill operation and to expand their diameters later to 600-800 mm. Removal of the drilled mass by gravity or by water, remote control of the machine and mechanized extension and disassembly of the drill support are called for. The machine was developed in two versions--with pneumatic drive and with electric drive. Operating productivity while drilling holes is 16-18 meters per hour, and 12-14 meters per hour while expanding them.

Work is being done to create the B100-200 drill rig, which is intended for drilling degasifying, water-draining and exploratory holes and holes for local measures against sudden outbursts of coal and gas. The holes are 100-130 mm in diameter and up to 200 meters long, for gently sloping seams, and up to 150 meters long for steep seams; drilling is performed from prepared excavations in any direction, with remote control and automatic extension of the drill mount. Moreover, the machine enables drilling of degasifying holes 93 and 97 mm in diameter and up to 150 m long for satellite seams at drilling angles of +45 to +90 degrees and up to 200 meters long at drilling angles of +45 to -90 degrees in rock up to category 9 in drillability.

There are two versions of the machine: the B100-200E with electric drive for mines that are working flatter and inclined seams, and the B100-200P with pneumatic drive for mines that are working steeper seams in the environment of the Donbass's Central Region. The machines' design productivity is up to 20 meters per hour when drilling in coal, 4-8 meters per hour when drilling through rock.

Dongiprouglemash's work to create machinery and equipment for mine transport has been aimed mainly at creating special types of underground conveyors for conveyorizing the main excavation routes and sections, creating new types of locomotives of high quality and improving auxiliary underground transport, equipment for lifting in the mines (various types of containers for lift work in mines--skips and cages, trailer equipment, mine parachutes, and others).

The 1L-100 and 1LT-80 conveyors were developed and refined for serial production, in order to conveyorize underground excavation. In 1976 the serial production of the 3LN-80 belt conveyor, which is the first domestic serially produced machine for excavating coal on slopes of up to 27 degrees, was mastered.

The special 2LB-120 gravity-incline belt conveyor was tested successfully at the Raspadskaya Mine in the Kuzbass and has been refined for series production.

The 1LTP-80 telescoping belt conveyor, for receiving rock mass from a drifting cutter-loader and for transporting it in a straight line (in plan view) over mine excavations with ±10-degree slope angles, has been tested and proved itself well for series production.

The use of a test model of the 1LTP-80 conveyor enabled a ventilation passage to be driven by the GPK cutter-loader at the Krasnolimanskaya Mine of the Dobropol'eugol' Association, with 1,335 meters excavated in 31 workdays. The pace of excavation rose 4-fold and labor productivity doubled.

Work continues on the creation of underground mine locomotives. In particular, test models of the D8 diesel locomotive of 600 and 900 mm gage have been tested. They have high productivity and autonomy of operation, and the 600-mm gage locomotive is equipped with a hydraulic transmission that provides for infinite adjustment of moving speed, smoothness of starting, and compactness of construction. D8 diesel locomotives can operate in mines that are in the supercategory with respect to gas and are hazardous with respect to sudden outburts of coal and gas.

Test models of high-frequency V14 electric locomotives have been produced; they are intended to replace the RP variants of medium and heavy battery-powered electric locomotives that are now in use on the main excavation haulage routes of mines that present gas and dust hazards.

In the area of auxiliary underground transport, work is being done jointly with VNPO Uglemekhanizatsiya to create a monorail way with a 2DMD diesel drive and to modernize the MDK passenger cableway.

Much work has been done to create skips 35 cubic meters in volume with a guillotine cut-off and self-contained hydraulic device for opening it, cages for various purposes, new mine parachutes, suspension devices for underground containers, and other equipment for lifting work in the mines.

Much attention is being paid to questions of unifying and raising the reliability of mine fans of the main ventilation system.

The unified VTsD-47U centrifugal fan with 3,200-kw drive, which is intended for replacement of the obsolete VRTsD-4.5 fan, has been developed. A test model of this fan has been made.

Modernized centrifugal VTs-31.5M and VTsD-31.5M fans, for which nonfreezing installation schemes have been developed, and VOD-40 and VOD-50 fans are being produced serially. Work continues on the VTs-31.5P and VTsD-31.5P fans, and also on a number of fans for local ventilation.

This is far from a complete listing of work that is being done by Dongiprouglemash designers to create and to modernize equipment for mechanizing labor-intensive processes of the underground working of coal deposits.

The Dongiprouglemash collective is full of resolve to apply all its efforts and knowledge toward the most rapid creation and introduction of new, highly productive mining equipment, to help the miners to fulfill the assignments set forth for the coal industry by the 25th CPSU Congress.

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CSO: 1822

PETROCHEMICAL PRODUCTS OF THE DONETS BASIN

Moscow TRUD in Russian 23 Dec 79 p 1

[Article by N. Mokrishchev, Lisichansk-Severodonetsk, Voroshilovgradskaya Oblast: "Report From the Forward Edge — Petrochemistry in the Donets Basin"]

[Text] Capacities for the production of ethylene and a second primary petroleum refining installation have been turned over for operation at the Lisichansk Refinery. At the same time a complex to produce polyethylene was launched at the Severodonetsk Azot Association. About one-third of the polyethylene produced in the country will now come from here. The raw material arrives by pipeline from Lisichansk.

Thousands of workers from the Ukraine and other Union republics built the petroleum refining installation and large-capacity ethylene production complex at a stepped-up pace.

"The short time span and technical complexity of construction demanded the use of progressive labor techniques," A. Narst, manager of the general contractor Lisichanskkhimneftstroy [Lisichansk Petrochemical Construction] Trust, related. "The critical path schedules for the overall project, operational planning, and monitoring work progress each day were done by computer."

I had a chance to watch brigades of the Promkhimmontazh [Industrial Chemical Installation] Trust install 380-ton columns vertically. They were assembled on the ground first, lined with pipe, insulated, and tested. This saved 33,000 worker-days and 60,000 rubles.

The installation worker brigades of A. Sheludchenko, V. Shishko, P. Baydina, and many others won fame during construction of the ethylene production complex. The collective of operations workers began

breaking in particular assemblies long before completion of construction and installation work.

"The ethylene complex is unlike any other in the country in terms of capacity, technical equipment, and economic efficiency," said I. Glushenko, manager of Severodonetskkhimstroy [Severodonetsk Chemical Construction] Trust. "Twelve computers monitor the production process, select optimal regimes, and prevent accidents. All production control will be exercised from a central console."

Performing highly complex production operations demanded that highly skilled cadres be trained. The best workers and specialists from existing shops of the association were sent here.

Launching the capacities for production of ethylene and polyethylene heralded the birth of still another sector in Voroshilovgradskaya Oblast and the entire Donets Basin: petrochemistry.

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CSO:1822

PETROLEUM AND GAS DRILLING ACCIDENTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Dec 79 p 2

[Article by M. Seid-Rza, director of the Azerbaijan Scientific Research and Planning Institute of the Petroleum Industry, doctor of technical sciences, Baku: "Conquering the Depths"]

[Text] The accident. It is not that rare a thing in deep drilling for petroleum and gas. In the last three years in Azerbaijan losses from accidents during well drilling have cost an impressive amount, more than 100 million rubles. More than 60 geological exploration and petroleum wells have been eliminated for various reasons.

What does this mean? What are the causes of such an undesirable phenomenon? Is it the increased complexity of drilling because of the great depths? Is it poor technical equipment and the poor professional training of specialists? Or can there possibly be other reasons such as mismanagement, a low level of labor and industrial discipline, and poor technical leadership? Let us have a look.

Drilling a deep well is a difficult and expensive business. It is done following plans specially developed at sectorial institutes, including our own institute. For wells with estimated costs of more than 3 million rubles an expert examination of the contract design is made at the head institute VNIIBT [All-Union Scientific Research Institute of Drilling Technique] and at the Ministry of the Petroleum Industry.

But then after the contract design has been defended at high levels it is accepted and recommended for performance and the brigade begins drilling the deep well. At this point the plan is set aside! In the language of specialists this is called deviation from the plan. What happens is that the designs of wells are changed, the arrangement of the bottom part of the drilling tool is modified, and casings are not dropped to the planned depth. Drilling solutions that are not authorized by industrial regulations and are tested only by eye are used, and so on.

These violations usually lead to complications. The well shaft curves, the casing columns buckle, and other emergency situations arise. Examples are easy to find. The principal cause of accidents in 80-85 percent of the cases at wells of the Aznest' [Azerbaijan Petroleum] and Kaspomorneftgazprom [Caspian Sea Petroleum and Gas Industry] associations is deviation from plans. This is what happened at the Kyursangya, Karabagly, Bakhar, and Bulla sea deposits. Sometimes even wells which could be saved and successfully brought to the planned depth are closed down for what is called "technical reasons."

Why do such things happen? There is a simple answer. The drilling administration is not actually responsible for closing down wells for technical reasons. If it does have any responsibility, it is purely symbolic; who can the lost millions be taken from? The distance covered and work volume performed are not removed from the indexes. That is why all "rescue" operations are sometimes neglected at accident-site wells, and all efforts directed to drilling new wells.

They say that it is better to prevent disease than treat it. The same thing applies in drilling. The most common accident in well drilling is getting the drilling tools stuck. In the last three years stuck drilling tools have led to the abandonment of 18 wells worth a total of about 35 million rubles.

And yet, a few years ago, AzNIPIneft' [Azerbaijan Scientific Research and Planning Institute of the Petroleum Industry] developed a set of industrial equipment and procedures to prevent the tool becoming stuck. The number of cases has dropped by more than five-sixths where they have been used! Despite this efficiency, introduction of the system is going extremely slowly. It is used at less than half of the wells being drilled.

The principal reason is that plants of the Azneftemashremont [Azerbaijan Petroleum Machinery Repair] Association are not producing enough tools to prevent sticking. The production of intermediate support for heavy drilling pipe has decreased in the current five-year plan and few safe locks for installation in each column are being produced. Many drilling enterprises do not even have tools to handle emergencies.

It appears to be time for the Ministry of the Petroleum Industry to put all the elements of the set into the basic plan of the Baku Azerneftemashremont Association. But it would be advisable to make the safety locks, elastic stabilizers, and other technical devices which have technical documentation for series production at plants of the Soyuzneftemash [USSR Petroleum Machinery] Association, which delivers common types of equipment to oil field workers. If they wanted to, the oil workers could reach an agreement with the Ministry of Chemical and Petroleum Machine Building concerning this matter.

The reliability of drilling and casing columns is another important factor in preventing accidents. But at the present time the quality of the pipe delivered to oil workers by enterprises of ferrous metallurgy leave much to be desired, to put it mildly. The products of the Taganrog and Nizhnedneprovsk plants draw particularly large numbers of complaints.

The situation is made worse by failure to deliver pipe on time. As far back as 1972 the Ministry of the Petroleum Industry published an order requiring that a full set of pipe and materials for drilling to a depth of 4,500 meters or more be on hand before drilling is begun. In practice, this is by no means always done. A deep well often spends months waiting for casing pipe, which sometimes causes accidents and other complications.

On the average, half again as much time is spent preventing accidents in a deep well compared to a well of average depth. This is not just a matter of more complex conditions; not a single institute is seriously involved with development of accident prevention technology and devising modern equipment for this purpose. It is obviously necessary to set up appropriate subdivisions at sectorial institutes to deal with this subject.

In our opinion, consideration should also be given to having institutes exercise author's supervision over execution of well-drilling plans they have developed. We have already taken the first step in this direction. Leading specialists from our institute have been assigned to drilling enterprises for operational solutions to questions that come up. However, there is no statute ratified by the Ministry of the Petroleum Industry with respect to author's supervision. The decision of the board of directors of the Ministry of the Petroleum Industry with respect to bonus payments to planners for performance of author's supervision is not being carried out either.

Highly qualified drilling brigades, foremen, and drilling chiefs are essential for successful deep well drilling. The practice of training drilling workers in a training combine is producing good results. But this is not enough today. A training area must be established in Baku where it is possible to simulate drilling conditions with anomalously high layer pressure and teach brigades ways to prevent and handle accidents and use equipment and machinery wisely. Such a training area could be established at our institute's training drilling rig.

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CSO:1822

MAL'TSEV ON OIL INDUSTRY ACHIEVEMENTS

Moscow TRUD in Russian 1 Jan 80 p 2

[Article by N. Mal'tsev, USSR Minister of the Petroleum Industry: "Entering 1980 — We Will Fulfill Our Obligations!"]

[Text] One of the best labor collectives of the Ministry of the Petroleum Industry, the Nizhnevartovsk Drilling Administration No 1, celebrated the new year of 1980 two months ago, on 1 November. Surgut Drilling Administration No 2 also fulfilled its plan for the first four years of the five-year plan ahead of schedule. The salute by General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev, published in the press in late May, was dedicated to these two collectives. "Under harsh natural and climatic conditions," the message said, "your collectives are successfully fulfilling and overfulfilling established assignments for well drilling. Many brigades are setting examples of courage and truly heroic labor and demonstrating professional skill."

In fact, even the extremely harsh winter was unable to stop the brigade headed by foreman G. Levin of the Nizhnevartovsk Administration from fulfilling its five-year well drilling plan ahead of schedule. V. Gromov's brigade finished its five-year plan assignment on 7 November 1979. The brigades of V. Volovodov and A. Manakov of Surgut as well as others are achieving outstanding indexes.

Our drilling workers have the slogan "No one falls behind!" In conformity with their obligations the Tyumen' oil workers are drilling an average of 66,000-73,000 meters of wells a year for the average brigade. The brigade of foreman V. Volovodov of the Surgut Administration set a sector record by drilling more than 90,000 meters of wells in a year. The collective led by foremen A. Shakshin and A. Spitsyn are not far behind.

It must be remarked that our work has been made much easier by the introduction of new equipment and the innovative activities of workers

and engineers. A comprehensive plan of steps to protect the environment is being successfully carried out.

The November 1979 Plenum of the CPSU Central Committee particularly stressed that despite the fact that our country has the world's largest fuel-energy complex, we must still strain to meet the growing fuel and energy needs of the national economy. This gives all of us, the oil workers, a special responsibility. In 1980 the sector must extract 580.9 million tons of petroleum and gas condensate, 21.5 million tons more than in 1979. But we are confident: the collectives of the enterprises and organizations of our sector, competing for a worthy celebration of the 110th anniversary of the birth of V. I. Lenin, will be able to meet the needs of our country's economy for black gold.

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CSO:1822

FUELS AND RELATED EQUIPMENT

PIPELINE CONSTRUCTION PROJECTS

Editorial Introduction

Moscow STROITEL'NAYA GAZETA in Russian 30 Dec 79 p 1

[Text] The November 1979 Plenum of the CPSU Central Committee particularly stressed the need for further development of the fuel and energy complex and improving its balance. The plan for 1980 envisions an increase of 3.6 percent in growth of petroleum extraction and seven percent for gas. Most of the increase in petroleum extraction will come from the regions of Western Siberia. Extraction is also increasing in Georgia and certain other regions of the country.

Even more important challenges have been outlined for the 11th Five-Year Plan. Meeting these challenges will depend largely on subdivisions of the Ministry of Construction of Petroleum and Gas Industry Enterprises. They are expected to lay thousands of kilometers of pipelines, build up fields, and establish good cultural and domestic conditions for petroleum and gas workers.

Surgut--Polotsk Pipeline

Moscow STROITEL'NAYA GAZETA in Russian 30 Dec 79 p 1

[Report by M. Malakhova, correspondent of the press center of the Ministry of Construction of Petroleum and Gas Industry Enterprises]

[Text] The objective of this pipeline is to solve the problem of reliable supply of petroleum products to the European part of the country. Plans call for building 32 pumping stations, tanks with capacities of 1 million cubic meters, 200,000 kilometers of power transmission lines, 3,500 kilometers of communications and automatic control lines, and 30 communities for operations workers.

The length of this transcontinental route will reach 2,100 kilometers by the beginning of the coming year.

Petroleum began to be pumped into the central segment of the pipeline late in the year. Siberian petroleum from the western foothills of the Ural Range moved toward the Volga. More than one-quarter of the 818-kilometer segment from Perm' to Gor'kiy is ready to receive "black gold" from the Middle Ob' region. The petroleum will soon cross the Udmurt ASSR on its way to the Mari ASSR and Gor'kovskaya Oblast.

Working under the slogan "Labor Relay," construction and installation workers, competing in honor of the 110th anniversary of V. I. Lenin, are also stepping up the pace of pipeline laying west of Gor'kiy. Work is getting underway in Novgorodskaya and Vitebskaya oblasts. The leaders in competition at the Lengazspetsstroy [Leningrad Gas Special Construction] Trust, where the brigade of welders headed by Aleksey Anisimov is setting the pace, have already prepared dozens of sections of pipe for welding into a solid line.

Samgori-Batumi Pipeline

Moscow STROITEL'NAYA GAZETA in Russian 30 Dec 79 p 1

[Report by M. Mikhaylova]

> [Text] After completion of testing Georgian petroleum began moving through the 145-kilometer segment of pipeline from Samgori to Suramskiy Pass. This is the first trunk pipeline across Georgia. It is being built by the collective of the recently formed [Gruztruboprovodstroy [Georgian Pipeline Construction] Trust.

After crossing Suramskiy Pass the construction and installation columns of the trust advanced toward the coast of the Black Sea. Operations workers such as Ilia Gelashvili, Shota Taktakishvili, and others overfulfill their assignments every day. The machine operators of the insulation and pipe-laying columns of Bolyag Khambashidze and Azor Kharazishvili have gone to work on the 281-kilometer route from Suramskiy Pass to Batumi.

Allied subdivisions from Krasnodarskiy Kray, Rostovskaya Oblast, and the Checheno-Ingush ASSR are also going into action. Insulation and pipe-laying brigades from the Krasnodartruboprovodstroy [Krasnodar Pipeline Construction] Trust are coming to the site as well.

Urengoy--Chelyabinsk--Petrovsk Pipeline

Moscow STROITEL'NAYA GAZETA in Russian 30 Dec 79 p 1

[Report by E. Volovik, engineer]

[Text] The Uralneftegazstroy [Ural Petroleum and Gas Construction] Trust turned over the Dolgoderevenskoye--Sysert' gas pipeline for operation ahead of schedule, so the enterprises of Sverdlovskaya Oblast now receive 15 million cubic meters of gas more each day. This line is a branch from the Urengoy--Chelyabinsk--Petrovsk gas pipeline.

The chief line for Ural petroleum and gas construction workers was the new 86-kilometer gas pipeline segment from Chelyabinsk to Petrovsk. It has proved difficult. The line runs over granite for more than 30 kilometers. Only blasting could make a way. Therefore the fate of the line is now in the hands of the drilling workers. In one hour one unit drills a hole 3-3.5 meters deep and advances 1.5 meters. That is their rate. Eight or nine holes a day are made. This means that the line advances 13-14 meters. But there are 13 drilling units working on the Chelyabinsk segment. Machine operators K. Bondar, N. Agarok, N. Rychkov, and others are doing an outstanding job.

Explosions thunder on the line almost every day. The blast are followed by excavator and bulldozer operators from a special administration of the Uralneftegazstroy Trust. Veterans of the administration such as S. Korsun, excavator operator and winner of the Badge of Honor, excavator operator R. Abdrakhmanov, bulldozer operator S. Sukhanov, and others show their skill on the rocky road. The machine operators do not measure their difficult work in kilometers; they keep count by mountains and rivers. Speaking of machine operator Rifa they say he has laid pipe across the Ural Mountains four times. This is very high praise. He is always given the most difficult job in rocky terrain.

Following the machine operators come the welders and insulation workers. Work to build the gas pipeline goes forward day and night, in three shifts.

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FUELS AND RELATED EQUIPMENT

INCREASING ROLE OF SHALE REPORTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Jan 80 p 2

[Article by V. Kucheryavyy, deputy chief of the Department of Science and Academic Institutions of the L'vov Obkom of the Ukrainian Communist Party: "The Shales Are Seeking Managers"]

[Text] We love to write and talk about the underground storehouses of oil, especially about those which have been discovered not so long ago in Siberia and the Far North. There is no doubt that significant reserves of liquid fuel have been gathered in natural reservoirs and even so they are not permanent. The vigorous growth of industry urges on the consumption of petroleum products and regardless of what these fields are, they will become more and more shallow with each year. According to the statistical data of the United Nations, even with an annual increase of petroleum consumption of 11 percent, the demand for it will increase 60-fold by the year 2000!

How can the proposed shortage be made up? Obviously they are trying in the southern republics to put their bets on development of solar energy and the role of inexpensive coal is increasing in Siberia and the Far East. But all this is unacceptable for the European part of the country where there is little sun and not so much coal now remains. Nuclear electric power plants have been called upon to play an enormous role here, but not they alone. We see a way out in extensive use of oil shales.

The total predicted shale reserves number many tens of billions of tons. And the hydrocarbon content in them is adequately high. Besides the electric power plants of the Estonian SSR, TETs [Heat and electric power stations] at Syzran' and the town of Slantsy of Leningradskaya Oblast are now operating on shales. One can add to them several small enterprises. But the overall pattern of shale raw material use does not change because of this: the specific weight of the given type of fuel in the energy balance of the country is extremely insignificant. Even more so since shales cannot be regarded only as fuel. The solid fuel minerals are an abundant source of raw material for the chemical and petrochemical industry with efficient and creative use of them. Even with very limited scales of

refining, the shale workers of the country produce approximately 765,000 tons of resin annually. Half of it is used to produce liquid fuel and oil for impregnation of wood, electrode coke, phenols for synthesis of tanning agents and adhesive resins and other products is refined from the other part. Moreover, carbolic acids, biological stimulants, various types of plastics and detergents can be produced.

The conditions of shale deposition are different. Some of them emerge directly to the earth's surface while others lie at a depth of 100-300 meters or somewhat greater. Consequently, the comparatively inexpensive quarry method can be used extensively for mining. Developments which prove the possibility of underground distillation of shales have recently appeared in worldwide practice.

Carpathian shales and those of the Boltyshevskoye deposit in Cherkasskaya and Kirovogradskaya Oblasts are most studied in the Ukraine. Their reserves are practically unlimited and the national economic significance is difficult to overestimate: after all, the oil and coal fields in the western oblasts of the Ukraine are being depleted in direct proportion to the increasing growth of industry. Shales should replace the customary types of fuel and as to how soon this will happen will depend on many factors. Unfortunately, until now shales have not been included completely among minerals. With rare exceptions, no one is conducting special exploration for them. At the beginning of the five-year plan, the Ministry of Geology of the republic was entrusted with conducting this exploration in the Precarpathians. The work was begun but it was then curtailed. This is explained by the fact that the mineral has no specific manager. If, for example, exploration for oil is being carried out, Minnefteprom [Ministry of the Petroleum Industry] finances the geologists and if exploration for coal is being carried out, Minugleprom [Ministry of the Coal Industry] of the USSR provides the financing and so on. Shales are "managerless" for the time being. The depth and boundaries of deposition, the content of useful components in various types of raw material--all this is determined very approximately by eye. And without precise knowledge, it is difficult to plan future plants and to carry out scientific research work.

The laboratory has been created at L'vov which is called the Laboratory of Problems for Complex Refining of Shales. It is headed by Candidate of Technical Sciences Ya. I. Sidorovich. Scientists are conducting extensive work to find the most efficient methods of producing materials from shales poor in organics which can be used as fuel. The search is being continued and its importance at least confirms the scientific forecast: the Boltyshevskoye deposit alone may provide the country 500 million tons of petroleum products extracted from shales.

Gravel, portland cement, Rubberoid, brick, asphalt and some other valuable materials have already been produced in the laboratory from the mineral part of the raw material. Scientists are attempting to arrange things so

that development of the technology of product production be combined with checking its properties in practice. For example, as soon as a sufficient quantity of asphalt was produced, construction of a section with the new pavement was begun on the L'vov-Stryy route. Almost two years of operation showed that the road made from the new material not only is not interior, but exceeds the presently existing roads in strength and other parameters.

Extensive experiments have been carried out on the use of the inorganic part of shales as construction materials. But perhaps the experiments which scientists of the Institute of the Geology and Geochemistry of Fuel Minerals jointly with a collective of the Nikolayev Cement and Mining Combine conducted merits special attention. In the given case the shales simultaneously performed two roles in the plant--the role of raw material and the role of fuel. As a result high-quality portland cement was produced and a considerable saving of thermal energy was achieved.

Very high fuel consumption is typical for the cement industry. Therefore, the use of rock containing organic matter as raw material is very intriguing and obviously the leading role belongs to shales here. It follows from the foregoing that selection of a site for construction of new enterprises of the cement industry should take into account this new type of raw material. And the experiment at Nikolayev shows that shales can be used successfully at existing cement plants without significant reconstruction of them. Unfortunately, Minstroymaterialov [Ministry of the Construction Materials Industry] of the USSR has not yet manifested an interest in this prospect.

The L'vov scientists have also not felt any interest on the part of other ministries. Confirmation of this is construction of an experimental plant for complex shale refining in the village of Verkhneye Sinevidnoye. Start-up of the plant would permit working out the industrial technology and production of input data for creation of enterprises capable of refining up to 10,000 tons of shale daily. Creation of an experimental and industrial base was extremely drawn out: deliveries of metal and nonstandard equipment were interrupted and other times the orders of the institute were simply brushed aside.

And in conclusion I would like to return to the problem of the lack of a manager for organics-lean shales. The rich shales of the Estonian type do have managers and interested persons. These are the All-Union Minugleprom whose enterprises mine them and Minenergo [Ministry of Power and Electrification of the USSR] whose electric power plants burn them, Minneftekhimprom [Ministry of the Petrochemical Industry] which uses shale raw material for production of chemical products and finally Minstroymaterialov. I will not begin to discuss the problem that too many cooks spoil the broth--it goes beyond the framework of this article, but I will limit myself only to the statement based on experience: without serious support on the part of the ministries, the search for effective industrial

technology for refining organics-lean shales will be drawn out for years and even decades. And I would like that the innovator in this important matter and that the curator of investigations be primarily Minenergo of the USSR.

The shales are now in reserve, but they can be brought into the battle whenever needed, and the sooner this occurs, the better it will be for both the energy and raw material balance of the country.

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CSO: 1822

BRIEFS

POWER SUBSTATION CONSTRUCTION--Mangyshlakskaya Oblast--Nine electric power substations will be constructed at the sites of the Severobuzachinskoye Oil and Gas Field. Workers of the Fifth Orenburg Installation Administration of the Elektrouralmontazh Trust are constructing them. Four substations will be constructed this year. The first of them is the Kalamkasskaya. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 11 Oct 79 p 2] 6521

OIL AND GAS EXPLORATION--Komi ASSR--A joyful report has arrived at the Third Oil and Gas Prospecting Expedition of the Ukhta Territorial Geological Administration. An influx of high-quality oil has been produced from a test well 160 kilometers from Vorkuta at the Nyadeyyusskaya area. The brigade of drilling foremen Vladimir Venkovskiy kept the watch. The secrets of the Bol'shezemel'skaya tundra are being revealed. The oil and gas prospectors are conducting the search in close cooperation with the seismic prospectors of the Pechora Geophysical Expedition. Oil and gas influxes were obtained at the Podimeyskaya area even earlier. And the seismic prospectors have discovered and turned over for deep drilling a total of 30 areas promising for oil and gas in the Bol'shezemel'skaya tundra. The volume of work in the tundra increased almost twofold during this five-year plan compared to the previous period. The prospectors of the interior are making a weighty contribution to formation and development of the Timan-Pechora territorial industrial complex, determined by the decisions of the 25th CPSU Congress. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 5 Sep 79 p 1] 6521

OIL PRODUCTION--Megion, Tyumenskaya Oblast--The geologists of the Megion Oil Prospecting Expedition have discovered a new field. It is located between Surgut and Nizhnevartovsk. This will significantly facilitate exploitation. The productive horizon is located at a depth of a little more than 2,000 meters and the drillers will carry out construction of the exploitation wells by the progressive cluster drilling method. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Oct 79 p 2] 6521

GAS PIPELINE CONSTRUCTION--The last seam of the Usinsk-Pechora gas pipeline has been welded ahead of schedule. This major line more than 150 kilometers long will be laid across Arctic swamps and rivers. The new pipeline is an important step in complex development of the natural resources of the north. Casing-head gas of the Usinsk and Vozeysk oil fields--two billion

cubic meters annually--will be delivered to the energy blocks of the Pechorskaya GRES by the steel channel. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 17 Aug 79 p 1] 6521

METHANE PRODUCTION--Donetsk--The scourge of the miners--methane gas--has become a convenient type of fuel at many boiler plants in the mines of the Donbass. Until now a significant part of the methane was not used: an explosion could occur when it was delivered in pure form to the boiler plants. Scientists of the Donetsk Polytechnical Institute helped to make methane safe. They enrich it with a small quantity of natural gas. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 8 Aug 79 p 1] 6521

SHALE PRODUCTION--Kokhtla-Yarve, Estonian SSR--A new section with capacity of one million tons of shale annually has become operational at the Sirgal mine. More than half of this fuel is mined by the open-pit method in the republic where shale lies close to the earth's surface on large areas. The labor of the miners at open pit mines is 2.5 times more productive than in underground mines. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 28 Aug 79 p 1] 6521

COOLING STATION CONSTRUCTION--A powerful cooling station has been turned over for operation ahead of schedule at the Vuktyl Gas Field. The gas extracted from the interior will now be purified and cooled prior to transport. The new plant will help to ensure stable operation of the underground blue fuel arteries. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 20 Oct 79 p 1] 6521

MARITIME TRANSPORT--Mys Kharasavey, Tyumenskaya Oblast--The last maritime transport has left Mys Kharasavey, where the northernmost settlement of Tyumen' geological prospectors is located. The summer Arctic season has been completed. The maritime fleet has become a dependable assistant of the oil prospectors since the very beginning of development of the natural resources of the northern extremity of the Yamal Peninsula. Motor ships hauled the first drilling rig to here. The atomic icebreakers "Lenin" "Sibir'" and "Arktika" operate in the ice of the Kara Sea during the height of the Arctic winter. This permitted the geologists to discover several fuel fields within compressed deadlines near the Arctic Ocean itself. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 4 Oct 79 p 1] 6521

DRILLING OPERATIONS--Krasnovodsk--The drilling brigade of foreman B. Logvinenko from the Turkmenneft' Association [Turkmen Petroleum Association] reached a record depth in the practice of our country--5,250 meters--by using a reducer type electric drill. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 19 Oct 79 p 1] 6521

FUEL PROSPECTORS--Ufa--The prospectors of the Tuymazy Geological Prospecting Office of the Bashneft' Production Division covered almost one million meters of the interior during the 10th Five-Year Plan and areas first profiled as promising for fuel in the western part of the republic. A total

of 67 new structures has been prepared for deep test drilling during this time. The prospectors have fulfilled the task of four years ahead of schedule and have saved 257,000 rubles above the planned saving. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 18 Sep 79 p 1] 6521

PERMAFROST RESERVOIRS--Yakutsk--Scientists of the Permafrost Studies Institute of the Siberian Department of the USSR Academy of Sciences feel that reservoirs of practically any capacity can be created in the permafrost. An underground storehouse for 2,000 tons of diesel fuel has been constructed in permafrost as an experiment on the institute's territory. The fuel excellently retained its qualities over a period of one year. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 14 Sep 79 p 1] 6521

OFFSHORE GAS FIELD--Baku--The offshore oil workers named the largest field in the Caspian Sea "Bakhar"--"Spring." The offshore gas site operating at the Bakhar field, which is 30 kilometers from the shore of the Apsheron Peninsula, is regarded as one of the most promising in the Caspian Sea. The coundaries of the proven gas-bearing area extend for almost 20 square kilometers and 10 stories of gas condensate beds located one atop the other descend into the interior in a unique puff-pastry over the entire expanse. The total length of the wells drilled at Bakhar exceeded 360,000 meters. Bakhar is now yielding almost half the gas produced at the offshore fields. And their fraction in the republic's energy balance has been increasing with each year and has now reached 90 percent of the entire production of the blue fuel in Azerbaijan. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 5 Sep 79 p 1] 6521

FIRE-ENCHANCED OIL PRODUCTION--Baku--Fire--the old enemy of oilfield workers--has become their ally. Thermal methods of affecting wells which reduced the yield of liquid fuel in time were used in the offshore field near Artem Island. A focal area of intrabed combustion was created at a depth of 1,000 meters. It caused intensive movement of the oil liquefied due to the high temperature to the wells. As a result many of them have increased their yield. This permits an additional increase of 1,000 tons of oil annually. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 16 Sep 79 p 1] 6521

GAS PIPELINE CONSTRUCTION--Rovno--Two large major gas pipelines have been laid on the territory of Mlinovskiy Rayon. The new gas distributing station, by means of which the natural fuel will be delivered to the rayon center of Mlinov and surrounding villages, has become operational. Gas will now be delivered to the kolkhozes Zarya, imeni Shevchenko, imeni Chapayev, Pravda, Svitanok and Otchizna. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 9 Sep 79 p 1] 6521

AUTOMATION OF GAS PRODUCTION--Shatlyk, Turkmen SSR--The automatic equipment of the Shatlyk Gas Producing Complex is operating reliably under the severe conditions of the desert. The last complex gas preparation installation has been connected to the central dispatcher console. Two operators

control tens of enterprises for production, processing and transport of fuel, located in the Karakumy, on an area of more than 500 square kilometers by using electronics. Automation of the complex has been completed. Development of the Shatlyk Gas Field, provided by decisions of the 25th CPSU Congress, has been accomplished ahead of schedule. The production complex will deliver more than 100 million cubic meters of fuel to the Central Asia-Centr major pipeline daily. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 20 Sep 79 p 1] 6521

OIL SPILL CLEANUP--A specialized ship constructed at the Zhdanov Shipyard, will ensure the cleanliness of coastal waters. Sea trials of the new oil spill collector, which will be assigned to one of the ports of Sakhalin, have already been completed. The floating cleaner will collect two hectares of water surface an hour. It can conduct operations in the water basin of the port, in the outer roadstead and also on the open sea. Having good stability in waves, the ship collects oil spills and floating garbage into tanks, returning filtered water to the sea. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jan 80 p 4] 6521

COAL PRODUCTION--Donetsk--Scientists of the Donetsk Polytechnical Institute have created a water cannon for coal production. Unlike units now used at hydraulic mines, the new installation is capable of transforming a continuous water flow into a pulsating flow. This "machine-gun jet" permits doubling of the cutting force of the unit in the system without an increase of pressure. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 11 Jan 80 p 1] 6521

AUTOMATED CONTROL SYSTEM--An automated gas supply control system has become operational at Voroshilovgrad. It will provide uninterrupted operation of the municipal gas facilities. Thousands of sensors located at all objects of industry and daily life transmit information to the dispatcher every 20 minutes about the presence of gas, its flow rate, the load distribution and the condition of the networks. If there is the slightest deviation from the given mode, the computer installed on the main console evaluates the situation operationally and assists the dispatcher in reaching optimum decisions. Electronics makes it possible for the gas workers to manipulate energy resources operationally and to save fuel. Development of similar systems for Kiev, Khar'kov, Dnepropetrovsk and other cities of the Ukraine is now being completed. They will become the basis for creation of a unified sector gas supply control system of the republic. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Nov 79 p 4] 6521

DEVELOPMENT OF AUTOMATION--To eliminate manual labor in construction of major oil and gas pipelines is the task faced by Western Siberia's youngest management collective on resistance welding of the Urengoytruboprovodstroy Trust [Expansion unknown]. Successful tests of the Sever welding complex convince one of the reality of accomplishing this plan. Upon instructions from the console, this unit prepares to join pipes, welds them and cuts off the formed outgrowths. The Sever is capable of performing three times more

work than one reinforced installation brigade per day. Management will receive yet another innovation in the near future--the Styk installation. This machine knows how to weld angles of rotation which until now have been joined by hand. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Nov 79 p 4] 6521

NEW OIL FIELD--A new oil field has been noted on the geological map of Kuybyshevskaya Oblast. A well with good daily yield has been drilled in Volzhskiy Rayon. Although many fields have been exploited for tens of years, the level of oil production in the oblast remains high. The operators explain this largely by the geological service of the Kuybyshevneft' Association [Kuybyshev Petroleum Association], which is involved in the search for new underground storehouses. [Text] [Moscow IZVESTIYA in Russian 13 Dec 79 p 3] 6521

OIL PIPELINE CONSTRUCTION--Shevchenko--The Kalamkas-Karazhanbas route for oil from the new Mangyshlak fields has been opened. The last "red joint" on the 267-kilometer run of the new oil pipeline. The builders erected this most important object under difficult conditions of desert, intense heat and cold winds. The highly productive use of equipment and high organization of labor made it possible to reduce by one-half the deadlines for turning over this oil river for industrial operation within nine months instead of 18. The black gold of the new fields of Kazakhstan is now flowing through the maritime port of Aktau on the Caspian to the refining enterprises of Baku, Kuybyshev and Volgograd. [Text] [Moscow IZVESTIYA in Russian 27 Dec 79 p 1] 6521

COAL MINING--Karaganda, 28 Dec 79--The new 8-Tentekskaya Mine became operational today ahead of schedule. Its output is four million tons of coal annually. The coal is mined here by highly productive mechanized complexes, it is delivered from the depths to the surface and is loaded into railroad cars by powerful high-speed conveyors. The delivery of materials and structures is completely mechanized. A computer monitors the operation of the equipment. High-speed "elevators" and underground "trolleys" deliver the miners to the face within calculated minutes and powerful air conditioners create the necessary microclimate. The miners have given their word to develop the design capacity of the enterprise within the shortest deadline and to celebrate the 110th anniversary of V. I. Lenin's birth with worthy labor. [Text] [Moscow IZVESTIYA in Russian 30 Dec 79 p 1] 6521

OIL REFINING PLANT--Chardzhou--The foundation of the main production installation has been laid at the oil refining plant under construction at Karakumy. The construction site of the enterprise stretches for 20 square kilometers of desert. Bases of the construction industry and for making up sets of equipment have been created among the sand hills and engineering communications lines have been laid. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 9 Dec 79 p 1] 6521

OIL WELL DRILLING--The inner walls of the exploitation pipes are coated with impurities (paraffin, salts and so on) as oil wells are operated. Precise information can always be obtained about this without stopping the wells if the technical condition of the pipes is monitored by a new method proposed by research associates of the Azerbaijan Polytechnical Institute imeni Ch. Il'drym. Since the input data for observation are only two parameters--a change in the value of temperature at the wellhead and information on yield--it becomes possible to accomplish remote control of the intensity of paraffin coating of operating pipes. [Text] [Baku VYSHKA in Russian 11 Dec 79 p 3] 6521

AUTOMATIC GAS PIPELINE--The collective of the Kaliningrad Experimental Plant Soyuzgazavtomatika has fulfilled the order of the operators of the Urengoy-Chelyabinsk gas pipeline ahead of schedule. It dispatched the last annual deliveries of the Impul's-2 remote control system. The system automatically controls gas transport. Because of it, it is no longer necessary to send workers out to the gas pipeline run in bad weather. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Dec 79 p 1] 6521

GAS PRODUCTION--The deepest well at the Dauletbad field in the Karakumy has yielded the largest gas influx. The drillers sunk the four-kilometer shaft ahead of schedule, having thus fulfilled the task of the five-year plan. The new field exceeds the Shatlyk field in fuel reserves. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 28 Dec 79 p 1] 6521

GAS WELL DRILLING--Ukhta, Komi ASSR--It is planned to drill a super deep test well--almost 7,000 meters--at the Vuktyl gas condensate field. It should penetrate a mass of sedimentary rock, which will permit study of the earth's interior. [Text]]Moscow PRAVDA in Russian 9 Nov 79 p 6] 6521

NATURAL GAS PRODUCTION--Two new natural gas fields--Kondrashovskoye in Donetskaya Oblast and Kotelevskoye in Poltavskaya Oblast--have now become operational in the system of Ukrgazprom [Ukraine All-Union Association for the Gas Industry]. Due to expansion of the gas pipeline network, the "blue fuel" has begun to reach many industrial enterprises and homes of city and rural residents of the republic. [Excerpt] [Kiev RABOCHAYA GAZETA in Russian 13 Nov 79 p 2] 6521

COAL ENRICHMENT--Irkutskaya Oblast--A new enrichment plant has become operational at Cheremkhovo. It will reprocess 4,100,000 tons of coal and produce 2,600,000 tons of high quality concentrate annually--raw material for the chemical industry. The waste will be used at thermal electric power plants. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 79 p 24] 6521

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